Education

NATIONAL INSTITUTE OF TECHNOLOGY, ARUNACHAL PRADESH

(ESTABLISHED BY MINISTRY OF HUMAN RESOURCE DEVELOPMENT, GOVT. OF INDIA)

Ethics

In GOD's own land, a fusion of scholastic students, innovative & motivated researchers & teachers and fast moving visionary leaders.

COURSE STRUCTURE & SYLLABUS FOR COMPUTER SCIENCE AND ENGINEERING

Steeping Stone and Sky reaching ladder to success

Research

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Service to Society

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DIRECTOR

FOREWORD

To **achieve the target of being a global leader in the field of Technical Education**, there is some sort of time bound urgency **to work quickly, massively and strongly**, in respect of National Institute of Technology, Arunachal Pradesh being an **" Institute of National Importance"** (by an Act of Parliament) and being **established only in five years back in 2010**. I have therefore adopted a **'B' plan** as stated below to achieve the primary goal of producing world class visionary engineers and exceptionally brilliant Researchers and Innovators:

B- Plan

- **Best Teaching**
- **Best Research**
- **Best Entrepreneurship & Innovation practices**
- **Best Services to Society**

In implementing the **'B' plan** in letter and spirit, the framing of syllabi has been taken **as an important legitimate parameter**. Therefore, extraordinary **efforts and dedications were directed for the last few years to frame**a syllabi**in a framework which is perhaps not available in the country as of today, with an Indian perspective in a Global context**.

Besides attention on **'B' plan** institute has given considerable importance to the major **faults of current Technical Education while framing the syllabus**. The major stumbling blocks in Technical Education today are:

I. The **present system is producing "Academic Engineers" rather than "Practical Engineers".**
II. The present system of education makes the **students to run after jobs rather than making them competent to create jobs.**
III. There is lack of **initiative to implement the reality of "Imagination is more important than knowledge".**

Taking due consideration of the findings made above, to my mind credible syllabi has been framed in the institute in which the major innovations are introduction of:

I. **I-Course (Industrial Course) one in each semester at least one, which is targeted to be taught by the Industrial Expert at least up to 50% of its component.**
II. **Man making and service to society oriented compulsory credit courses of NCC/NSS, values & ethics.**

III. **Compulsory audit course on Entrepreneurship for all branches.**
IV. **Many add-on courses that are (non-credit courses) to be offered in vacation to enhance the employability of the students.**
V. **Many audit courses like French, German, and Chinese to enhance the communication skill in global scale for the students.**
VI. **Research and imagination building courses such as Research Paper Communication.**
VII. **Design Course as "Creative Design".**

Further, the syllabi are framed **not to fit in a given structure as we believe structure is for syllabus and syllabus is not for structure. Therefore, as per requirement of the courses, the structure, the credit and the contact hours have been made available** in case to case.

The syllabus is also innovative as it includes:

I. **In addition to the list of text and reference books, a list of journals and magazines for giving students a flexibility of open learning.**
II. **System of examination in each course is conventional examination, open book examination and online examination.**

Each course has been framed with definite objectives and learning outcomes. The Syllabus has also identified the courses to be taught either of two models of teaching:

I. **J.C.Bose model of teaching where practice is the first theory.**
II. **S.N.Bose model of teaching where theory is the first practice.**

Besides the National Institute of Technology, Arunachal Pradesh has initiated a scheme of **simple and best teaching** in which for example:

I. **Instead of teaching RL, RC and RLC circuit separately, only RLC circuit will be taught and with given conditions on RLC circuits, RL and RC circuits will be derived and left to the students as interest building exercise.**
II. **Instead of teaching separately High Pass Filter, Band Pass Filter and Low Pass Filter etc.; one circuit will be taught to derive out other circuits, on conditions by the students.**

I am firmly confident that the framed syllabus will result in **incredible achievements, accelerated growth and pretty emphatic win over any other systems** and therefore **my students will not run after jobs rather jobs will run after them.**

For the framing of this excellent piece of syllabus, **I like to congratulate all members of faculty, Deans and HODs in no other terms but "Sabash!".**

Prof. Dr. C.T. Bhunia
Director, NIT, (A.P.)

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First Semester:

Subject Code	Subject	P	T	L	Credit
MAS -101	Engineering Mathematics - I	0	1	3	4
CHY – 101	Engineering Chemistry	2	0	3	4
PHY – 101	Engineering Physics - I	2	0	3	4
BIO – 101	Life Science	0	0	3	3
ME-101	Engineering Mechanics	0	0	3	3
CE – 101	Engineering Drawing	3	0	0	2
ME – 102	Workshop Practice-I	3	0	0	2
EE – 101	Basic Electrical & Electronics Engineering	2	0	3	4
HSS – 101	Communication Skill	2	0	0	1
HSS – 102	NSS / NCC	2	0	0	1
HSS – 103	Foreign Language (French / Korean) (Audit)	2	0	0	1
		18	1	18	29

Second Semester:

Subject Code	Subject	P	T	L	Credit
MAS -201	Engineering Mathematics - II	0	1	3	4
ME – 201	Basic Mechanical Engineering	0	0	3	3
CSE - 201	Programming in C	8	0	0	4
CHY – 201	Environmental Science	0	0	3	3
PHY - 201	Engineering Physics - II	2	0	3	4
ECE – 201	Digital Electronics & Logic Design	2	0	3	4
HSS – 201	Historiography of Science & Technology	0	0	3	3
CE- 201	Basic Civil Engineering	3	0	0	2
ME-202	Workshop Practice-II	3	0	0	2
HSS – 202	Foreign Language (German / Chinese) (Audit)	2	0	0	0
		20	1	18	29

Third Semester:

Subject Code	Subject	P	T	L	Credit
MAS – 301	Discrete Mathematics	0	1	3	4
EE – 301	Circuit Theory & Networks	2	0	3	4
CSE – 301	Computer Organization & Architecture	2	0	3	4
CSE – 302	Data Structure & Algorithm	2	0	3	4
MAS – 302	Optimization Methods	0	0	3	3
CSE – 303 (I)	Object Oriented Programming	2	0	3	4
HSS - 301	Behavioural Science	0	0	2	2
		8	1	20	25

Fourth Semester:

Subject Code	Subject	P	T	L	Credit
MAS – 401	Stochastic Process	0	1	3	4
CSE – 401	Formal Languages & Automata Theory	0	0	3	3
CSE – 402	Advanced Computer Architecture	2	0	3	4
CSE –403	Design & Analysis of Algorithm	2	0	3	4
CSE – 404	System Software & Administration	2	0	3	4
EE – 405	Control System Engineering	2	0	3	4
HSS – 401	Entrepreneurship & Innovation	0	0	3	3
		8	1	21	26

Fifth Semester:

Subject Code	Subject	P	T	L	Credit
ECE – 501	Microprocessors, Microcontrollers & Embedded	2	0	3	4
ECE-521	Principle of Communication Engineering	2	0	3	4
CSE – 501	Operating System	2	0	3	4
CSE – 503(I)	Database Management system	2	0	3	4
HSS – 501	Industrial Management	0	0	3	3
CSE - 505	Graph Theory & Combinatorics.	0	0	3	3
MAS - 521	Computational Numerical Methods	2	0	3	4
		10	0	21	26

Sixth Semester:

Subject Code	Subject	P	T	L	Credit
CSE – 601	Computer Networking	2	0	3	4
CSE – 602 (I)	Software Engineering	2	0	3	4
HSS – 601	Engineering Ethics & IPR	0	0	3	3
HSS – 602	Disaster Management	0	0	2	2
CSE – 603	Creative Design	2	0	0	1
CSE – 604	Computer Graphics & Multimedia Technology	2	0	3	4
CSE – 605	Compiler Design	2	0	3	4
		10	0	17	22

Seventh Semester:

Subject Code	Subject	P	T	L	Credit
CSE – 701 (I)	Internet & Web Technology	2	0	3	4
HSS – 701	Mass Communication for Technology	0	0	3	3
XXX – 701	Research Paper Communication	2	0	0	1
CSE- - 7XX	Elective – I	0	0	3	3
CSE- - 7XX	Elective – II	0	0	3	3
CSE- - 702	Cryptography & Network Security	2	0	3	4
CSE- - 703	AI & Neural Network	2	0	3	4
		8	0	18	22

Eighth Semester:

Subject Code	Subject	P	T	L	Credit
XXX – 801	Industrial Training	2	0	0	1
XXX – 802	Project Works	16	0	0	8
XXX – 803	Seminar	2	0	0	1
XXX - 804	Grand Viva	12	0	0	6
		32	0	0	16

Teaching Methodology:

All subject papers in each of the semester require to be divided into two groups; one group will be taught in a model named "JC Bose model" where practice is first theory. The other model will be "SN Bose model" which is the conventional mode of teaching with theory as the first practice.

Semester	J C Bose Model	S N Bose Model
1st	Engineering Mechanics Engineering Drawing Workshop Practice-I Basic Electrical & Electronics Engineering. NSS/ NCC.	Engineering Mathematics- I. Engineering Chemistry. Engineering Physics-I. Life Science. Communication Skill.
2nd	Basic Civil Engineering Workshop Practice-II Programming in C Environmental Science Digital Electronics & Logic Design Historiography of Science & Technology	Engineering Mathematics- II. Basic Mechanical Engineering Engineering Physics-II
3rd	Computer Organization & Architecture Data Structure & Algorithm Optimization Methods Object Oriented Programming	Discrete Mathematics Circuit Theory & Networks Behavioural Science
4th	Advanced Computer Architecture System Software & Administration	Stochastic Process Control System Engineering Entrepreneurship & Innovation Formal Languages & Automata Theory. Design & Analysis of Algorithm.
5th	Microprocessors, Microcontrollers & Embedded System. Database Management system.	Operating System Industrial Management. Graph Theory & Combinatorics. Principle of Communication Engineering. Computational Numerical Methods.
6th	Computer Networking. Engineering Ethics & IPR. Disaster Management. Software Engineering Computer Graphics & Multimedia Technology.	Compiler Design Creative Design.
7th	Internet & Web Technology	Mass Communication for Technology. Research Paper Communication. Elective – I Elective – II Cryptography & Network Security AI & Neural Network.

8th	Industrial Training Project Works Seminar Grand Viva	

Summery Table of Different Courses:

Semester	Credit Course	I- Course	Audit Course	Add-on course
1st	Engineering Mathematics- I. Engineering Chemistry. Engineering Physics-I. Life Science. Engineering Mechanics Engineering Drawing Workshop Practice-I Basic Electrical & Electronics Engineering. Communication Skill.	**NIL**	NSS/ NCC Foreign Language (French/ Korean)	NIL
2nd	Engineering Mathematics- II. Basic Mechanical Engineering Engineering Drawing II Workshop Practice-II Programming in C Environmental Science Engineering Physics-II Digital Electronics & Logic Design Historiography of Science & Technology	NIL	Foreign Language (German/ Chinese)	NIL
3rd	Discrete Mathematics Circuit Theory Computer Organization & Architecture Data Structure & Algorithm Optimization Methods Behavioural Science	Object Oriented Programming	NIL	PHP
4th	Stochastic Process Formal Languages & Automata Theory. Control Engineering Entrepreneurship & Innovation Design & Analysis of Algorithm. Advanced Computer Architecture	System Software & Administration	NIL	
5th	Microprocessors, Microcontrollers & Embedded System. Operating System Industrial Management. Graph Theory & Combinatorics. Principle of Communication Engineering.	Database Management system.	NIL	High Performance Computing

	Computational Numerical Methods.			
6th	Computer Networking. Engineering Ethics & IPR. Disaster Management. Creative Design. Computer Graphics & Multimedia Technology. Compiler Design	Software Engineering	NIL	
7th	Mass Communication for Technology. Research Paper Communication. Elective – I Elective – II Information Security AI & Neural Network	Internet & Web Technology	NIL	Ruby
8th	Industrial Training Project Works Seminar Grand Viva			

Examination System:

Semester	Conventional	Open Book	Online
1st	Engineering Chemistry. Life Science. Engineering Mechanics Engineering Drawing Workshop Practice-I Communication Skill. NSS/ NCC Foreign Language (French/ Korean)	Engineering Mathematics- I. Engineering Physics-I. Basic Electrical & Electronics Engineering.	
2nd	Engineering Mathematics- II. Environmental Science Engineering Drawing II Workshop Practice-II Engineering Physics-II Digital Electronics & Logic Design History of Science & Technology Foreign Language (German/ Chinese)	Basic Mechanical Engineering Programming in C	
3rd	Discrete Mathematics Circuit Theory Computer Organization & Architecture Data Structure & Algorithm	Object Oriented Programming	

	Optimization Methods Behavioural Science		
4th	Stochastic Process Control System Engineering Advanced Computer Architecture. Entrepreneurship & Innovation Design & Analysis of Algorithm.	Formal Languages & Automata Theory.	System Software and Administration
5th	Microprocessors, Microcontrollers & Embedded System. Operating System Industrial Management. Graph Theory & Combinatorics. Computational Numerical Methods.	Database Management system.	Principle of Communication Engineering.
6th	Engineering Ethics & IPR. Disaster Management. Creative Design. Computer Graphics & Multimedia Technology. Compiler Design	Computer Networking.	Computer Networking.
7th	Internet & Web Technology. Mass Communication for Technology. Research Paper Communication. Elective – I Elective – II AI & Neural Network	Cryptography & Network Security	Internet & Web Technology.
8th	Industrial Training Project Works Seminar Grand Viva		

First Semester (Common to all)

Subject Code	Subject	P	T	L	Credit
MAS -101	Engineering Mathematics - I	0	1	3	4
CHY – 101	Engineering Chemistry	2	0	3	4
PHY – 101	Engineering Physics - I	2	0	3	4
BIO – 101	Life Science	0	0	3	3
ME-101	Engineering Mechanics	0	0	3	3
CE – 101	Engineering Drawing	3	0	0	2
ME – 102	Workshop Practice-I	3	0	0	2
EE – 101	Basic Electrical & Electronics Engineering	2	0	3	4
HSS – 101	Communication Skill	2	0	0	1
HSS – 102	NSS / NCC	2	0	0	1
HSS – 103	Foreign Language (French / Korean) (Audit)	2	0	0	1
		18	1	18	29

Name of the Module: Engineering Mathematics-I
Module Code: MAS 101
Semester: 1st
Credit Value: 4 [P=0, T=1, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of:

1. providing high quality education in pure and applied mathematics in order to prepare students for graduate studies or professional careers in mathematical sciences and related fields,
2. imparting theoretical knowledge and to develop computing skill to the students in the area of Science and Technology,
3. providing teaching and learning to make the students competent to their calculating ability, logical ability and decision making ability,
4. giving students theoretical knowledge of Calculus, Algebra and their practical applications in the various fields of Science and Engineering,
5. apply their knowledge in modern industry or teaching, or secure acceptance in high-quality graduate programs in Mathematics and other fields such as the field of quantitative/Mathematical finance, Mathematical computing, statistics and actuarial science.

B. Learning Outcomes:

Students successfully completing this module will be able to:

1. students will become more confident about their computing skill, logical skill and decision making skill,
2. students will find various applications of calculus and algebra in the practical fields science and engineering,
3. students will become more competent to analyze mathematical and statistical problems, precisely

define the key terms, and draw clear and reasonable conclusions,

4. student will be able to use mathematical and statistical techniques to solve well defined problems and present their mathematical work, both in oral and written format, to various audiences (students, mathematicians, and non-mathematicians),
5. student will be able to understand, and construct correct mathematical and statistical proofs and use the library and electronic data-bases to locate information on mathematical problems,
6. student will be able to explain the importance of mathematics and its techniques to solve real life problems and provide the limitations of such techniques and the validity of the results,
7. student will be able to propose new mathematical and statistical questions and suggest possible software packages and/or computer programming to find solutions to these questions.

C. Subject Matter:

Unit I:

Matrices: Introduction to Matrices and their basic properties, Transpose of a matrix, verification of the properties oftransposes, Symmetric and Skew symmetric matrices and their properties. Determinant of a square matrix, Minors andCofactors, Laplace's method of expansion of a determinant, Product of 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, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and non homogeneous linear simultaneous equations, Eigen values and Eigen vectors of a square matrix (of order 2 or 3), Eigen values, Caley-Hamilton theorem and its applications, Diagonalisation of a square matrix with real and distinct eigen values (up to 3rd order).

Unit II:

Successive Differentiation: Higher order derivatives of a function of single variable, Leibnitz's theorem (statementonly) and its application, problems of the type of recurrence relations in derivatives of different orders.

Mean Value Theorems & Expansion of Functions: Rolle's theorem(statement only) and its application, Mean Value theorems – Lagrange & Cauchy (statement only) and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders (statement only) and its application, Expansions of functions by Taylor's and Maclaurin's theorem, Maclaurin's infinite series expansion of the functions.

Unit III:

Integrals: Double and triple integrals and evaluation of area and volume. Change of order of integration.
Reduction formula: Reduction formulae both for indefinite and definite integrals.

Unit IV

Complex variables: complex numbers, De-Moivre's Theorem and its applications, Inverse circular and Hyperbolic functions, functions, continuity, Differentiability, analyticity -Cauchy Riemann equations and properties of ana1ytic functions, Cauchy's integral and Cauchy's integral formula, derivatives of analytic functions.

D. Teaching/ Learning/ Practice Pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination Pattern:

Theoretical Examination: Written

F. Books:

1. *Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern.*
2. *Babu Ram, "Engineering Mathematics", Pearson Education.*
3. *H. K. Dass "Higher Engineering Mathematics", S. Chand & Co.*
4. *B.S. Grewal , "Engineering Mathematics", S. Chand & Co.*
5. *PulakKundu , "A Text book on Engineering Mathematics" Vol. I, ChhayaPrakashani.*
6. *Pal &Das, "Engineering Mathematics" Vol. I, U.N. Dhar.*
7. *John Bird , "Higher Engineering Mathematics",4th Edition, 1st Indian Reprint 2006, Elsevier.*
8. *L. Rade and B. Westergren, "Mathematics Handbook: for Science and Engineering", (5th edition, Indian Edition 2009, Springer).*
9. *M. J. Strauss, G. L. Bradley and K. L. Smith , "Calculus", 3rd Edition, 1st Indian Edition 2007, Pearson Education.*
10. *S. K. Adhikari, "A text Book of Engineering Mathematics-I", DhanpatRai and Co. (P) Ltd.*
11. *S. S. Sastry, "Engineering Mathematics", PHI, 4th Edition, 2008.*
12. *Ravish R Singh, "Engineering Mathematics", McGraw Hill.*
13. *Das & Mukherjee, "Differential Calculus", U.N. Dhar& Sons Private Ltd.*
14. *Das & Mukherjee, "Integral Calculus", U.N. Dhar& Sons Private Ltd.*

G. Magazines:

1. *Current Science (Indian Academy of Science).*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society).*
3. *Mathematical Spectrum (The University of Sheffield).*
4. *Mathematics Magazine (Mathematical Association of America).*
5. *+Plus magazine (University of Cambridge).*
6. *Mathematics Today, London Metropolitan University.*

H. Journals:

1. *Journal of Engineering Mathematics, Springer.*
2. *Journal of Computational and Applied Mathematics, London Metropolitan University.*
3. *The Journal of Indian academy of Sciences.*
4. *Bulletin of Pure and Applied Sciences.*

Name of the Module: Engineering Chemistry
Module Code: CHY 101
Semester: 1st
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. imparting theoretical and practical knowledge to the students in the area of Chemistry.
2. providing teaching and learning to make students acquainting with advanced science and technology in Chemistry.
3. injecting the future scope and the research direction in the discipline of Chemistry.
4. making students competent to the research and development in advanced science and technology in Chemistry.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. adequately trained to become Chemists, Scientist and Chemical Engineers.
2. skilled both theoretically and practically to do operation, control and maintenance works in Chemistry and Chemical Engineering.
3. substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Chemical Thermodynamics: Concept of Thermodynamic System: diathermal wall, adiabatic wall, isolated system,closed system, open system, extensive property, intensive propertyIntroduction to first law of thermodynamics: different statements, mathematical form; internal energy: physical significance, mathematical expression (ideal and real gas), Enthalpy: physical significance, mathematical expression. Cp and CV definition and relation; adiabatic changes; reversible and irreversible processes; application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lovoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law. Second law thermodynamics; Joule Thomson and throttling processes; inversion temperature; evaluation of entropy: characteristics and expression, entropy change in irreversible process, entropy change for irreversible isothermal expression of an ideal gas, entropy change of a mixture of gases.

Work function and free energy: physical significance, mathematical expression for ideal and real gases obeying Vander Waals' equation, Gibbs Helmholtz equation.

Condition of spontaneity and equilibrium

Unit II:

Electrochemistry Conductance: Conductance of electrolytic solutions, specific conductance, equivalent conductance,molar conductance and ion conductance, effect of temperature and concentration. 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 $AgNO_3$.

Electrochemical cell: Cell EMF and its Thermodynamic significance, single electrode potentials and its applications; hydrogen half cell, quinhydronehalf cell and calomel half cell. Storage cell, fuel cell.Application of EMF measurement. Reaction Dynamics: Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Arrhenius equation. Mechanism and theories of reaction rates (Transition state theory, Collision theory).Catalysis: Homogeneous catalysis and heterogeneous catalysis.

Unit III:

Structure and reactivity of Organic molecule: Electronegativity, electron affinity, hybridization, Inductive effect,resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free

radicals. Brief study of substitution, eliminations and addition reactions.**Instrumental Methods of Analysis:** Introduction to instrumental methods such as IR, UV, VIS, NMR and Mass spectrometry.

Unit IV:

Polymerization: Concepts, classifications and industrial applications. Polymerization processes(addition andcondensation polymerization), degree of polymerization, Copolymerization,stereo-regularity of polymer, crystallinity and amorphicity of polymer. Preparation, structure and use of some common polymers: plastic (PE, PP, PVC, bakelite), rubber (natural rubber, SBR, NBR), fibre(nylon 6.6, polyester). Conducting and semi-conducting polymers.

Industrial Chemistry: Solid, liquid and gases fuels; constituents of coal, carbonization of coal. Coal analysis:Proximate and ultimate analysis. Classification of coal, petroleum (LPG, CNG), gasoline, octane number, aviation fuel, diesel, cetane number.Natural gas, water gas, Coal gas, bio gas.Bio-diesel.

D. List of practical's: (Minimum eight experiments should be conducted by students)

1. Acid –base titration :(Estimation of commercial caustic soda)
2. Red-ox titration: (Estimation of iron using permanganometry)
3. Complexometric titration: (Estimation of hardness of water using EDTA titration)
4. Chemical Kinetics :(Determination of relative rates of reaction of iodide with hydrogen peroxide at room temperature (clock reaction).
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
   (a)Determination of the strength of a given HCl solution by titration against a standard NaOH solution.
   (b) Analysis of a mixture of strong and weak acid by strong base.
8. Preparation of a homo-polymer by free radical initiated chain polymerization and determination of its molecular weight by viscosity average molecular weight method.
9. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Written.
2. Practical Examination: Conduct Practical Examination and viva-voce.

G. Reading lists:

Books:

1. *Rakshit P. C., "Physical Chemistry" Sarat Book Distributor.*
2. *Dutta R. L. ,"Inorganic Chemistry" The New Book Stall.*
3. *Levine " Physical Chemistry" McGraw-Hill Education.*
4. *Finar I. L., "Organic Chemistry (vol. 1 & 2)." Pearson.*
5. *lasston Samuel, " Text Book of Physical Chemistry" New York, D. Van Nostrand company.*
6. *Lee J. D., "Concise Inorganic Chemistry", Wiley India.*
7. *Sykes,P., "Guidebook to Mechanism in Org.Chems", Orient Longman.*
8. *Chakraborty D.K. , "Solid State Chemistry", New Age International.*

9. *Gupta M.C. , "Atomic & Molecular Spectroscopy", New Age.*
10. *Gowarikar V.R. , "Polymer Science", New Age.*
11. *Mishra G.S. , "Introductory Polymer Chemistry", New Age.*
12. *Nasipuri D. ,"Stereochemistry of Organic Compounds", New Age.*
13. *Kalsi P.S, "Spectroscopy of Organic Compounds", New Age.*
14. *Kalsi P.S. ,"Organic Reactions & their Mechanism", New Age.*
15. *Maity and Maity ," Engingeering Chemistry",U & N Dhar Publisher.*
16. *Ray, Das, Biswas, "Engingeering Chemistry", New Central Book Agency.*

Magazines:

1. *Chemical science*
2. *chemistry Today*
3. *chemistry For You*

Journals:

1. *Journal of Organic Chemistry, ACS*
2. *Journal of Physical Chemistry, ACS*
3. *Material Science & Engineering B, Elsevier*

Name of the Module: Engineering Physics - I
Module Code: PHY 101
Semester: 1st
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. imparting theoretical & practical knowledge to the students in the area of Engineering Physics.
2. providing teaching and learning to make students acquainting with modern state-of-art of Engineering.
3. injecting the future scope and the research direction in the field of Physics with specific specialization.
4. making students competent to design & development of Engineering Physics.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. adequately trained to become Engineers.
2. substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Scalar and vector: Scalar and vector, dot and cross product, Scalar and vector fields, concept of Gradient, Divergenceand Curl.

General Properties of Matter: Elasticity, Viscosity, Surface tension.

Unit II:

Acoustics: Simple Harmonic Motion, Damped Vibration, Forced Vibration
Thermal Physics: Kinetic Theory of Gas, conductivity & Radiation

Unit III:

Physical Optics: Introduction to Interference, Diffraction, Polarization

Elementary Solid State Physics: Elementary ideas of crystal structure : lattice, basis, UNIT cell, fundamental types oflattices-Bravis lattice, simple cubic, f.c.c and b.c.c lattices, Miller indices and miller planes, Co-ordination number and atomic packing factor, X-rays: Origin of characteristics and continuous X-ray, Bragg's law (no derivation), determination of lattice constant

Unit IV:

Fundamental of Quantum Physics: Wave particle duality, Compton effect, Photo electric effect, Heisenberg'suncertainty relation, concept of wave packet.

D. List of practical's: (Minimum five experiments should be conducted by students)

1. Determination of thermal conductivity of a good conductor by Searle's method
2. Determination of thermal conductivity of a bad conductor by Lees and Charlton's method
3. Determination the dispersive power of the material of a given prism
4. Use of carry Foster's bridge to determine unknown resistance
5. Determination of Young Modulus by flexure method and calculation of bending moment and shear force at a point on the beam
6. Determination of coefficient of Viscosity by Poiseulle's capillary flow method
7. Determination of wavelength of light by Newton's ring method.
8. Determination of Surface tension of a liquid.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Written.
2. Practical Examination: Conduct Practical Examination and viva-voce.

G. Reading lists:

Books:

1. *Murrat R. Spiegel, Seymour Lipschutz& Dennis Spellman, " Vector Analysis" Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2009.*
2. *Takwale and Puranic, "Classical Mechanics" Tata McGraw-Hill Publishing*
3. *Sengupta&Chatterjeee, "A Treatise on General Properties of Matter " New Central Book Agency (P) Limited*
4. *D. Chattopadhyay and P. C. Rakshit, " Vibrations, Waves and Acoustics" BOOKS and Allied (P) Ltd.*
5. *N. K. Bajaj, "The physics of Waves and Oscillations" Tata McGraw Hill Education Private Limited, New Delhi.*
6. *A. Ghatak, "Optics" 4th Edition, Tata McGraw Hill Education Private Limited, New Delhi. .*
7. *S. O. Pillai, "Solid State Physics", Wiley Eastern Ltd.*
8. *Kittel, "Solid State Physics" 7th edition, Wiley India.*
9. *Richard P. Feynman, Robert B. Leighton and Matthew Sands, " The FEYNMAN Lectures on*

Physics" Vol. I to Vol. IV, Pearson

10. *D. Chattopadhyay and P. C. Rakshit, " An Advanced Course in Practical Physics" New Central Book Agency (P) Ltd.*

Magazines:

1. *Physics Reports*
2. *Resonance*
3. *Scientific American*
4. *Physics Today*
5. *Physics For You*
6. *Physics Teacher (IPS)*
7. *Physics World (IoP-UK)*
8. *Physics News (IPA)*

Journals:

1. *Nature*
2. *Proceedings of the National Academy of Sciences*
3. *IEEE Spectrum*
4. *Journal of Physics: (Including A, B, C, D, E, F & G) 8. Journal of Scientific & Industrial Research*
5. *Indian Journal of Engineering & Material Sciences*
6. *Indian Journal of Radio and Space Physics*

Name of the Module: Life Science
Module Code: BIO 101
Semester: 1st
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. imparting knowledge on the origin of Earth and life forms on Earth, appreciating importance of biological diversity and understanding biomolecules being the main component of life.
2. understanding "Cell" – the basic UNIT in different life forms, and structure and function of different tissue systems in plants and animals.
3. imparting knowledge on water relations, nutrient uptake and assimilation, and metabolism in plants.
4. providing knowledge on Bioenergetics of plant and animal cells, different organelles involved in electron transport systems, nervous, digestive and immune systems in animals.

B. Learning Outcomes:

Upon completion of the subjects:

1. students will understand the characteristics of living organisms; appreciate the importance of diversity of life and their interaction with the environment.
2. students will be able to explain the interrelationship between biomolecules and the living system,

and influences of biomolecules upon the structure and function of intracellular components.

3. students will have a broad knowledge on Bioenergetics of plant and animal cells; and a brief on important biological systems of animal.

C. Subject matter:

Unit I:

Origin of Life: History of earth, theories of origin of life and nature of the earliest organisms.

Varieties of life: Classification, Five kingdoms, viruses (TMV, HIV, Bacteriophage), Prokaryote (Bacteria-cellstructure, nutrition, reproduction), Protista, Fungi, Plantae and Animalia.

Chemicals of life: (Biomolecules)- Carbohydrates lipids, amino acids, proteins, nucleic acids and identification ofbiomolecules in tissues.

Unit II:

Cell: Cell concept, structure of prokaryotic and eukaryotic cells, plant cells and animal cells, cell membranes, cellorganelles and their function, Structure and use of compound microscope.

Histology: Maritimes (apical, intercalary, lateral) and their function; simple tissue (parenchyma, collenchymas,sclerenchyma); Complex tissue (xylem and phloem); Tissue systems (epidermal, ground, vascular); primary body and growth (root, stem, leaf); Secondary growth (root, stem). Animal tissues (Epithelial, connective, muscle and nervous tissues) and their functions in the body.

Unit III:

Transport: Plant water relationships, properties of water, diffusion, osmosis, imbibition, uptake of water by roots andtheories of transport of water through xylem (ascent of water in xylem, cohesion-tension theory), apoplast and symplast theory; Transpiration-structure of leaf, opening and closing mechanisms of stomata, factors affecting transpiration and significance of transpiration.

Nutrition: Mineral Nutrition in plants, Heterotrophic nutrition in plants; Photosynthesis (Autotrophic-forms ofnutrition), Chloroplast structure, two pigment systems, photosynthetic UNIT, light absorption by chlorophyll and transfer of energy, phosphorylation and electron transport system, Calvin-Benson Cycle (C_3), Hatch Slack Pathway (C_4), Crassulacan Acid Metabolism (CAM), factors affecting photosynthesis.

Unit IV:

Energy Utilization: (Respiration) - Structure of mitochondria, cellular respiration, relationship of carbohydratemetabolism to other compounds, Glycolysis, fermentation, formation of acetyl co-A, Kreb cycle, Electron Transport System and Oxidative Phosphorylation, ATP, factors affecting respiration;

Elementary canal in humans, nervous and hormonal control of digestive systems, fate of absorbed food materials; Nutrition in humans, Reference values; General characteristics of blood vascular system, development of blood systems in animals, Composition of blood, circulation in blood vessels, formation of tissue fluids, the heart, functions of mammalian blood, the immune system.

D. Teaching/ Learning/ Practice pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination pattern:

Theoretical Examination: Written

F. Reading Lists:

Books:

1. *J.N. Mitra, D. Mitra and S.K. Chowdhuri, "Studies in Botany" Volume I & II, Moulik Library Publisher, Kolkata,*
2. *M.J. Pelczar, E.C.S. Chan and N.R. Krieg, "Microbiology", Tata McGraw Hill Education, New Delhi, 1993.*
3. *B.P. Pandey, "Plant Anatomy", S. Chand & Company Ltd., New Delhi, 1997.*
4. *H.S. Srivastava, "Plant Physiology", Rastogi Publishers, Meerut, 1998.*
5. *B.P. Pandey, "College Botany" Volume I & II, S. Chand Publisher, New Delhi, 2012.*
6. *N.A. Campbell, J.B. Reece, "Biology" Person Education, Inc& Dorling Kinderley Publishing, Inc.*

Magazines:

1. *National Geographic Chennel, http://science.nationalgeographic.co.in/science/earth*
2. *Wikipedia, The Free Encyclopedia, http://www.bbc.co.uk/science/earth*
3. *Wikipedia, The Free Encyclopedia, http://en.wikipedia.org/wiki/HIV*

Journals:

1. *Journal of Biology, BioMed Central Ltd, London, England.*
2. *Annals of Botany, Oxford Journals, USA.*
3. *Plant and Cell Physiology, Oxford journals, USA.*

Name of the Module: Engineering Mechanics
Module Code: ME 101
Semester: 1st
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the following objectives:

1. Ability to utilise scalar and vector analytical techniques for analysing forces in statically determinate structures.
2. Ability to apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
3. Student gets a basic idea of Centre of gravity, moment of inertia, mass moment of inertia, friction.

B. Learning Outcome:

Upon completion of the subject, students should have the knowledge of:

1. Different type of forces and how to resolve forces.
2. Centre of gravity of different size, shape, and solid.
3. Centre of gravity, moment of inertia, mass moment of inertia, friction.

C. Subject Matter:

Unit I:

Forces and Moments: Force, Moment and Couple, Resultant of forces, Forces in space Equilibrium, FBD, General equations of equilibrium, Analysis of forces in perfect frames, Brief

introduction to vector approach.

Unit II:

Friction: Introduction to dry friction, laws of friction, friction of simple machines, inclined planes, Screw jacks.

Unit III:

Centre of gravity and moment of inertia: Centre of gravity of axes, volume and composite bodies, Area moment of inertia and mass moment of inertia for plane figures and bodies.

Unit IV:

Dynamics: Kinematics and Kinetics, Rectilinear motion of particles, determination of position velocity and acceleration under uniform rectilinear motion (uniform and non-uniform accelerated rectilinear motion), Relative motion, construction of x-t, v-t and a-t graphs (simple problems), Projectile motion, Normal and Tangential components, Radial and Transverse components, simple problems, Equation of motion, D. Alembert's principle.

D. List of Practical's: No Practical's

E. Teaching/ Learning/ Practice pattern:

Teaching: 60%
Learning: 40%
Practice: 0%

F. Examination pattern:

1. Theoretical Examination.

G. Reading lists:

Books:

1. *Mariam & Kraige, "Engineering Mechanics (Vol-II) Dynamics", Wiley.*
2. *Mariam & Kraige, "Engineering Mechanics, Vol-I (Statics)", Wiley.*
3. *Timoshenko," Engineering Mechanics", MGH.*
4. *Nelson, "Engineering Mechanics", TMGH.*
5. *Shames and Rao, "Engineering Mechanics", Pearson.*
6. *S. Chakraborty, "Engineering Mechanics", Everest Publishing House.*
7. *Beer and Johnson, "Vector Mechanics for Engineers", TMGH.*

Magazines:

1. *Popular Mechanics Everyday.*
2. *Engineering Magazine.*

Journals:

1. *International Journal of Applied Mechanics and Engineering.*
2. *Journal of Applied Mechanics, ASME.*
3. *Journal of Engineering Mechanics, ASCE.*

Name of the Module: Engineering Drawing
Module Code: CE 101
Semester: 1st

Credit Value: 2 [P=3, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. increase the ability to understand Engineering Drawing.
2. learn to sketch and take field dimensions.
3. learn to take data and transform it into graphic drawings.
4. learn basic Auto Cad skills.
5. learn basic engineering drawing formats.
6. prepare the student for future Engineering positions.

B. Learning Outcome:

Upon completion of the subject student's ability to**:**

1. hand letter will improve.
2. perform basic sketching techniques will improve.
3. draw orthographic projections and sections will improve.
4. use architectural and engineering scales will increase.
5. produce engineered drawings will improve
6. convert sketches to engineered drawings will increase.
7. cope up and become familiar with office practice and standards will increase.
8. handle and become familiar with Auto Cad two dimensional drawings will improve.
9. develop good communication skills and team work will improve.

C. Subject Matter:

Unit I:

Indian Standards: Line symbols and line groups,sheet layout of rules of printing, preferred scales.

Unit II:

Orthographic Projection: Theory of Orthographic Projection.

Unit III:

First and third angle system of projection: Technical sketching, Multi-planar representation.

Unit IV:

Glass box concept: Sketching of orthographic views and line.

D. List of Practical's:

1. Technical writing of various type of letters.
2. Technical sketching of Scales- Plain, Diagonal, Vanier, Comparative and chord.
3. Technical sketching of Projection of points.
4. Technical sketching of Projection of lines.
5. Technical sketching of Projection of plains.
6. Technical sketching of Projection of solids.
7. Technical sketching of orthographic Projection

D. Teaching/ Learning/ Practice Pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination pattern:

1. Practical Drawing.

2. Assignment.

F. Reading lists:

Books:

1. N. D. Bhatt, "Machine Drawing". Charotar Publishing House Pvt. Ltd.

2. V. Laxmi Narayanan& M. L. Mathur, "A Text Book of Machine Drawing", Jain Brothers, New Delhi.

3. Jolhe "Machine Drawing", Charotar Publishing House Pvt. Ltd.

4. K. Venugopal andV. R. Prabhu "Engineering Graphics", New Age International Pvt. Ltd.

5. K. C. John, "Engineering Graphics", PHI Learning Pvt. Ltd.

6. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar,"Engineering Graphics with Auto CAD", PHI Learning Pvt. Ltd.

7. K. V. Natarajan, "Engineering Graphics", Dhanalakshmi Publisher.

8. French and Vierk "Fundamentals of Engineering Drawing", MGH.

Magazines:

1. *Machine Design.*
2. *Design to Part Magazine.*

Journals:

1. *International Journal of Design Engineering*

Name of the Module: Workshop Practice-I
Module Code: ME 102
Semester: 1st
Credit Value: 2 [P=3, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. acquire skills in basic engineering practice.
2. identify the hand tools and instruments.
3. acquire measuring skills.
4. acquire practical skills in the trades.
5. acquire practical skills in welding, carpentry, fitting.

B. Learning outcomes:

Upon completion of the subject, students should have the knowledge of:

1. workshop safety.
2. handling workshop tools, machines.
3. different welding types.
4. different carpentry joints.
5. working principle of different tools.

C. Subject matter:

Unit I:

Carpentry (Wood Working): Timber, Seasoning and Preservation, Plywood and Plyboards, Carpentry Tools, Engineering applications, Different Joints.

Unit II:

Metal Joining: Definitions of welding, brazing and soldering processes and their applications, Oxy acetylene gas welding process, equipment and techniques, types of flames and their applications, Manual metal arc welding technique and equipment, AC and DC welding, electrodes, constituents and functions of electrodes, welding positions, types of weld joint, common welding defects such as cracks, slag inclusion and porosity.

Unit III:

Bench work and Fitting: Tools for laying out, chisels, files, hammers, hand hacksaw, their specifications and uses.

Unit IV:

Laying out (bench work): Sawing and finishing by filing.

D. List of Practicals:

1. T-Lap joints and Bridle joint (Carpentry Shop).
2. Gas Welding practice on mild steel flat/sheet upto 3 mm thick.
3. Lap joint by Gas Welding (upto 3mm thick).
4. Manual Metal Arc Welding practice (upto 5mm thick).
5. Pattern Making. (Carpentry Shop)
6. Laying out (bench work); Sawing and Finishing by Filing.

E. Teaching/Learning/Practice pattern:

Teaching: 20%
Learning: 20 %
Practice: 60%

F. Examination pattern:

1. Job making.
2. Viva-voce.

G. Reading lists:

Books:

1. *M.L. Begeman and B.H. Amstead, "Manufacturing Process" John Wiley, 1968.*
2. *W.A.J. Chapman and E.Arnold, "Workshop Technology" Vol. 1, 2 & 3, CRC press Prentice Hall*
3. *B.S. Rghuwanshi, "Workshop Technology" Vol. 1 & 2 – Dhanpat Rai and Sons.*
4. *Hazra and choudhary "Workshop Technology" Vol. 1, 2, Media Promoters*
5. *VirenderNarula "Workshop Technology",S.K.Kataria& Sons*

Magazines:

1. *International Metal Working News.*
2. *Industrial Distribution*

Journals:

1. *International Journal of Machine Tools and Manufacture*
2. *Journal of Manufacturing Science and Engineering, Transactions of the ASME*
3. *Journal of Manufacturing Technology and Research*

Name of the Module: Basic Electrical & Electronics Engineering
Module Code: EE 101
Semester: 1st
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:
The course is designed to meet the objectives of:

1. To make the students familiar with the course and its importance.
2. Introduction to Basic Electrical & Electronics Engineering.
3. Basic knowledge of DC circuits, Electromagnetism, AC fundamental.
4. Introduction to DC, AC single and three phase machine, their construction and working principles.
5. Introduction to measurement of electrical quantities.
6. Making familiar with P-N Junction.
7. Briefing to Semiconductor devices and their applications

B. Learning outcomes:
Students successfully completing this module will be able to:

1. Students will develop interest in learning the subject and be adequately trained to solve network problems.
2. Students will be skilled both theoretically and practically to utilize conventional circuit solving procedures.
3. Students will be substantially prepared to take up prospective design assignments.

C. Subject matter:
Unit I:

DC circuits: 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: 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, selfand mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, lifting power of Electromagnet.

Unit II:

Decision making: Simple If statement, if-else statement, nested if else statement, Switch statement, nested switch, the operator, goto statement.
Decision making & branching: while statement, do-while statement, for statement. Array

Unit III:

Transformers: Construction,Types, emf equation, voltage, current, impedence and turns ratio;

auto-transformer. DC machines (motor and generator)–Construction, types, emf equation, equivalent circuit, starting, speed control,braking, applications. Single phase motors, types; need of rotating field, starting, running, speed control and applications.

Unit IV:

Introduction to Semiconductors: Band gap, Conductivity, intrinsic and extrinsic types, Doping: donors and acceptors, n-type and p-type.

P-N Junction: Energy band diagram, Formation of P-N junction, built-in-potential,forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zenerbreakdown, Avalanche breakdown and its reverse characteristics, junction capacitance and varactordiode. Simple diode circuits, load line, linear piecewise model; rectifiers: half wave, full wave, its PIV, DC voltage and current, ripple factor, efficiency, Clipper&Clamper Circuits.

Introduction to Transistors: Formation of PNP/ NPN junctions, energy band diagram; transistor mechanism and principle of transistors, Biasing: CE, CB, CC configuration, transistor characteristics: cut-off,active and saturation mode, Early effect.Introduction to Field Effect Transistor: Structure and characteristics of JFET and MOSFET, depletion and enhancementtypes, CS, CG, CD configurations.

D. List of practicals: (Minimum eight experiments should be conducted by students)

1. To construct a series-parallel circuits and verify:
   Ohms law, Kirchhoff's laws
   Verify Thevenin's theorem.
   Verify Norton's theorem.
   Verify Maximum Power Transfer theorem.
2. Construct an R-L-C circuit and verify
   Voltage across R, L and C
   Verify the phasor sum of the voltages across the combination of R-L-C.
3. Measurement of power in the circuit made in 2 above and verify:
   The power consumed by Resistance, Inductance and Capacitance and the total power consumed by the circuit.
4. How does the power factor varies in the circuit of 2 above if Resistance, Inductance and Capacitance are varied.
5. Study of VI Characteristics of Silicon Diode.
6. Study of VI Characteristics of Zener Diode.
7. Design and Analysis of a Half wave Rectifier using Diode.
8. Design and Analysis of a center-tap Full wave Rectifier using Diodes
9. Design and Analysis of a Bridge Rectifier Circuit.
10. Design and Analysis of a Clipping Circuit with one voltage source. (Different possible configurations)
11. Design and Analysis of a Clipping Circuit with two voltage source. (Different possible configurations)
12. Design and Analysis of a Clamper Circuit.
13. Analysis of the characteristics of BJT (CE and CB mode)
14. Design and Analysis of fixed bias circuit using NPN transistor (DC)
15. Design and Analysis of emitter bias circuit using NPN transistor (DC)
16. Determination of the characteristics of JFET.
17. Determination of the characteristics of MOSFET.
18. Verification of truth tables of logic gates.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Written.
2. Practical Examination: Conduct Practical Examination and viva-voce.

G. Reading lists:

Books:

1. *Theraja, "Electrical technology, Vol 1 & 2", Nirja Construction & Development Co. (P) Ltd.*
2. *Sen, P.C. "Principles of Electrical Machines and Power Electronics" John wiley and sons.*
3. *V.K.Mehta, "Basic Electrical Engineering" S.Chand and Co. Publication.*
4. *Guru and Hiziroglu "Electric Machinery and Transformers", Saunders College Pub. NY, 1990*
5. *Malvino: "Electronic Principle" Tata McGraw-Hill Publishing Co.Ltd.*
6. *Millman &Halkias: "Integrated Electronics" Tata McGraw-Hill Publishing Co.Ltd.*
7. *Boylestead and Nashelsky, Electronic Devices and Circuits Theory, 9/e, PHI, 2006.*
8. *R.P.Jain,ModernDigitalElectronics,3/e,TMH,2000.*

Magazines:

1. *IEEE Industrial Electronics*
2. *Electrical Line, Canada.*

Journals:

1. *Electrical Engineering, Springer.*

Name of the Module: Communication Skill
Module Code: HSS 101
Semester: 1st
Credit Value: 1 [P=2, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. to increase the Students ability to improve and utilize the skills necessary to be competent interpersonal communicator.
2. to Increase the students' understanding of his or her own communication behaviour.
3. to Increase the students' understanding of others communication behaviours.
4. to improve the students' communication skills in both social and professional contexts.
5. to improve the students ability to demonstrate effective complete resolution skills.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. develop their communication skills on the specific subject.
2. direct effectively in their work place.

C. Subject matter:

Unit I:

General Principles of Communication and Oral Communication: The Process of Communication, Principles of Communication (communication barriers, levels of Communication, Communication network, verbal, non-verbal) and Professional Communication. The Speech Mechanism, IPA symbols (vowel and consonant sounds), minimal pairs, word transcription, stress and intonation , active listening, types of listening, traits of a good listener, active versus passive listening,

Unit II:

Constituents of Effective Writing and Vocabulary: The sentence and its parts, articles, the verb phrase, tense and aspect, the active and passive, the adjective, interrogative and negative sentences, concord, preposition. Paragraph development, summary writing and reading comprehension. Word formation processes: affixation, compounding, converting, use of words in different parts of speech, idioms and phrases.

Unit III:

Business Correspondence and Communication Strategies: Characteristics of Business Letters, Drafting: Bio-data/Resume/Curriculum vitae (theory). Report Writing: Structure, Types of Reports (theory). Presentation Skills, public speaking and group discussion (theory) and Soft Skills (theory).

D. List of practicals:

1. Issue Writing
2. Writing Resumes and Applications
3. Writing Memos
4. Reading Comprehension
5. Vocabulary
6. Presentation Skills
7. Group Discussion
8. Extempore
9. Debates

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination

G. Reading lists:

Books:

1. *NiraKonar, "English Language Laboratory", Prentice Hall India*
2. *Jones, Daniel, Cambridge English Pronouncing Dictionary with CD, New Delhi, 2009.*
3. *Roach, Peter, English Phonetics and Phonology with CD, CUP, India, 1983.*
4. *Cambridge Learners Dictionary with CD, CUP, New Delhi, 2009.*
5. *Rajeevan, Dutt, Sasikumar, A course in Listening and Speaking I & II with CD, CUP, New Delhi, 2007.*

6. Rajeevan and Dutt, Basic Communication Skills, CUP, New Delhi, 2007.
7. Software: Orell Digital Language Lab Software.
8. R.C. Sharma and Krishna Mohan Business Correspondence and Report Writing 10.Meenakshi
9. Raman and Sangeeta Sharma Technical Communication, Oxford.
10. Krishna Mohan and MeeraBannerji ,Development Communication Skills

Magazines:

1. *Communication Skill Magazine*
2. *Magazine for Communication*
3. *Communication Studies*

Journals:

1. *Developing Effective Communication Skills.*
2. *Cooperative Communication Skills.*
3. *Improving Communication Skills.*
4. *Key Communication Skills.*
5. *Journal on Communication.*

Name of the Module: Foreign Language (French) (Audit)
Module Code: HSS 103
Semester: 1st
Credit Value: 0[P=2, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. the French Language course accords to a method created for Indian students who are complete beginners in French and who wish to acquire verbal communication skills in current scenario.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. develop four skills in French i.e. Reading, Writing, Speaking, Comprehension.

C. Subject matter:

Unit-I:

Preliminaries of Grammar: Articles, Gender and Number of Nouns and Adjectives. Personal and Tonique Pronouns, Demonstrative and Possessive Adjectives, Preposition and Adverbs.

Unit-II:

Conjugction : Present, Past ana Future Tense: Types of Sentences.
Pronominal Verbs Conjugation of Verbs of all the Groups in present Tense and Introduction to past and Future tense ,Interrogation, Negation and Imperatives.

Unit-III

Names of days, seasons. Months, colours, garments body parts and numbers. Computer, Commerce & Marketing related Vocabulary &Terminology.

D. List of practicals:

1. Issue Writing
2. Writing Resumes and Applications
3. Writing Memos
4. Reading Comprehension
5. Vocabulary
6. Presentation Skills
7. Group Discussion
8. Extempore

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination

G. Reading lists:

Books:

1. Suggested book-Ailes Volume-I
2. G. Mauger: I (La Langue et de Civilisation francaise) Alliance française Paris Ile-de-France.

Name of the Module: NSS/ NCC
Module Code: *HSS 102*
Semester: 1st
Credit Value: 1 [P=2, T=0, L=0]
Module Leader:

Second Semester

Subject Code	Subject	P	T	L	Credit
MAS -201	Engineering Mathematics - II	0	1	3	4
ME – 201	Basic Mechanical Engineering	0	0	3	3
CSE - 201	Programming in C	8	0	0	4
CHY – 201	Environmental Science	0	0	3	3
PHY - 201	Engineering Physics - II	2	0	3	4
ECE – 201	Digital Electronics & Logic Design	2	0	3	4
HSS – 201	Historiography of Science & Technology	0	0	3	3
CE- 201	Basic Civil Engineering	3	0	0	2
ME-202	Workshop Practice-II	3	0	0	2
HSS – 202	Foreign Language (German / Chinese) (Audit)	2	0	0	0
		20	1	18	29

Name of the Module: Engineering Mathematics-II
Module Code: MAS 201
Semester: 2nd
Credit Value: 4 [P=0, T=1, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. imparting theoretical knowledge to the students about three and more dimensional objects in space and to improve their capability of visualising of objects in space.
2. making student competent enough to construct a differential equation/ mathematical modelling for every real life situation with its solution.
3. giving students theoretical knowledge of vectors with the flavour of Calculus.
4. introduce the concepts of Laplace and Fourier transforms and its application to the solution of differential equations (ODE & PDE) to the students.

B. Learning Outcomes:

Upon completion of the subject:

1. students will have strong visualising capability in their mind about any object.
2. students are so trained that they will recognize various real life situation/ problem and able to solve them by constructing a differential equation/ mathematical model.
3. students will be able to find the Laplace and Fourier representation as well as transforms of functions of one variable.

C. Subject matter:

Unit I:

Coordinate Geometry Of Three Dimensions: Equation of a sphere, plane section of a sphere, tangent plane, orthogonality of spheres, definition and equation of right circular cone and right circular cylinder.

Unit II:

Vector Calculus: Differentiation and integration of vector functions, scalar and vector fields, Gradient, Directional derivative, Divergence, Curl. Line integral, Surface integral and Volume integral, Green's, Gauss' and Stokes' theorems (without proofs) and their simple applications.

Unit III:

Ordinary Differential Equations: Formulation of Differential equations, Linear Differential Equations and reducible to linear form, Exact Equations, Reducible to exact form, Linear differential equations with constant coefficients, Second order ordinary differential equations with variable coefficients, Homogeneous form, Change of dependent variable, Change of independent variable, Normal form, Variation of Parameters, Solution in series of second order LDE with variable co-efficient (C.F. only), Bessel's and Legendre differential equations with their series solutions, Orthogonal properties, recurrence relations and generating function of Bessel functions and Legendre polynomials.

Partial Differential Equation: Linear and non-linear Partial Differential Equation of order one, Linear Partial Differential Equation with constant coefficient, Partial Differential Equation of order two with variable coefficients.

Unit IV:

Basic Transform: Laplace & Fourier.

D. Teaching/ Learning/ Practice Pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination Pattern:

Theoretical Examination and open book examination.

F. Reading Lists:

Books:

1. *Shanti Narayan, "Analytic Solid Geometry", S. Chand.*
2. *M. D. Raisinghania, "Vector Analysis", S. Chand.*
3. *R. K. Jain& S R. K Iyengar, "Advanced Engineering Mathematics", Narosa.*
4. *M. D. Raisinghania, "Ordinary & Partial Differential equations", S. Chand.*
5. *M. D. Raisinghania, "Advanced Differential equations", S. Chand.*
6. *H. K. Dass, "Higher Engineering Mathematics", S. Chand & Co.*
7. *B. S. Grewal , "Engineering Mathematics", S. Chand & Co.*
8. *Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern.*
9. *S. L. Ross, "Differential equations", Willey.*
10. *Pal & Das , "Engineering Mathematics", Vol. I, U. N. Dhar.*
11. *J. N. Sharma, A. R. Vasishtha, "Vector Calculus", Krinhna Prakashan Mandir, Meerut.*
12. *P. P. Gupta, G. S. Malik, "Vector Calculus", Kedarnath Ramnath, Meerut.*
13. *Brahma Nand, B. S. Tyagi, B. D. Sharma, "Co-ordinate Solid Geometry", Kedarnath Ramnath, Meerut, Delhi.*
14. *A. R. Vasishtha, D. C. Agarwal, "Analytical Geometry of Three Dimensions", KrinhnaPrakashan Media (P) Ltd, Meerut.*

Magazines:

1. *Current Science (Indian Academy of Science).*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society).*
3. *Mathematical Spectrum(The University of Sheffield).*
4. *Mathematics Magazine (Mathematical Association of America).*
5. *+Plus magazine (University of Cambridge).*
6. *Ganithavahini (Ramanujan Mathematical Society).*
7. *Mathematics Today, London Metropolitan University.*

Journals:

1. *Journal of Engineering Mathematics, Springer.*
2. *Journal of Computational and Applied Mathematics, London Metropolitan University.*
3. *The Journal of Indian academy of Sciences.*
4. *Bulletin of Pure and Applied Sciences.*

Name of the Module: Basic Mechanical Engineering
Module Code: ME 201
Semester: 2nd
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is design to meet with the following objectives:

1. Ability to utilise scalar and vector analytical techniques for analysing forces in statically determinate structures.
2. Ability to apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
3. Student gets a basic idea of Engineering Mechanics, Fluid Mechanics, Strength of Material and Thermodynamics.

B. Learning Outcome:

Upon completion of the subject, students will have the:

1. Knowledge of different type of force resolving.
2. Knowledge of centre of gravity of different size, shape, and solid.
3. Knowledge of basic idea of Engineering Mechanics, Fluid Mechanics, Strength of Material and Thermodynamics.

C. Subject Matter:

Unit I:

Thermodynamics: Introduction to Thermodynamics, Concepts of system control volume, state, properties, equilibrium, quasi- static process, reversible & irreversible process, cycle. Zeroth Law and Temperature, Heat and Work transfer Definition, Sign convention, various P-dV work done (Isobaric, Isochoric, Polytrophic, adiabatic and isothermal processes) and related problems.

Unit II:

1st Laws of Thermodynamics for closed & open systems (ii) Non Flow Energy Equation (iii)

Steady State, Steady Flow Energy Equation and related problems. , Equivalence of two statements, Definition of Heat Engines, Heat pumps, Refrigerators Carnot and related problems. Air Standard cycles – Otto and Diesel cycle and their efficiencies and related Problems.

Unit III:

. **Fluid Mechanics**: Properties & Classification of Fluids – ideal & real fluids, Newton's law of viscosity, Newtonian & Non Newtonian Fluids, Compressible & Incompressible fluids Pressure at a point, Pascal's law, Measurement of Pressure, Continuity equation, Bernoulli's equation and its application

Unit IV:

Strength Of Materials: Concept of simple stresses and strains. Yield strength, Normal stress Shear stress, Bearing stress, Normal strain, Shearing strain, Hooke's law, poisson's ratio, Examples.

D. List of Practical: No practicals**.**

E. Teaching/Learning/Practice Pattern:

Teaching: 60 %
Learning: 40 %
Practice: 0%

F. Examination Pattern:

1. Theoretical Examination.

G. Reading List:

Books:

1. P. K. Nag , "Engineering Thermodynamics" 2nd Edition, Tata McGraw Hill Publisher
2. S. K. Som& G. Biswas, "Introduction to Fluid Mechanics & Fluid Mechines" Tata McGraw Hill
3 Timoshanko & Young, "Elements of Strength of Materials" D Van Nostrand Company
4. Mariam & Kraige, "Engineering Mechanics (Vol-II) Dynamics" Wiley Publisher
5 Meriam & Kraige, "Engineering Mechanics, Vol-I (Statics)" Wiley India

Magazine:

1.*PopularMechanics Everyday*
2. Engineering Magazine

Journals:

1. International Journal of Applied Mechanics and Engineering
2. Journal of Applied Mechanics, ASME
3. Journal of Engineering Mechanics, ASCE.

Name of the Module: Programming in C
Module Code: CSE 201
Semester: 2nd
Credit Value: 4 [P=8, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. introducing art, science and engineering of C programming language to the students of all UG programs,
2. teaching and training of different problems in data structures,
3. guiding and training students to write efficient coding,
4. guiding & training students to fragment problems into different functions or units.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand the basic terminology used in computer programming
2. write, compile and debug programs in C language in different operating systems.
3. design programs involving decision structures, loops and functions.
4. use and apply the dynamics of memory by the use of pointers in engineering applications.
5. use and apply the differences between structure oriented and function oriented programming in programming applications.

C. Subject matter:

Unit I:

Basic Idea: Algorithm, Flowchart, Program, Top down approach, Procedure oriented etc..

Keyword & Identifiers: History & Importance of C, Basic structure of C programs, C fundamentals: The C character set identifier, Constants and keywords, data types & size, variable names, declaration, statement , C token, symbolic constent.

Operators and Expression: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment & Decrement operators, Condition Operators, Bitwise Operators, Special operators, precedence of arithmetic operators.

Managing Input & output operations: using of printf( ) &scanf( ).

Unit II:

Decision making: Simple If statement, if-else statement, nested if else statement, Switch statement, nested switch, the operator, goto statement.

Decision making & branching: while statement, do-while statement, for statement. Array

Unit III:

Array: Declaration, Initialization and processing One-dimension array, Two-dimension array and multi dimension array and their operations.

String & pointer: String: Operation on String without using library function and using library function. Pointer: Declaration of pointer variables, accessing the variable by using pointer, pointer increment and decrement operator, pointer and array.

Functions: Basic functions, function type, function with no argument & no return value, function with no argument but return value, function with argument & return value, Storage class identifier, Call by reference, Recursive function. Pointer to function.

Unit IV:

Structure & Union: Defining a structure, accessing of structure variable, structure and array, array within structure. Nested structure, structure & functions, Pointer & structure, Unions, Enum.

File management system: Advantage of using file, Open ,close, read. write in the files, Operation on files.

Dynamic memory Allocation: use of Malloc, calloc, realloc, free. Library functions, Implementation of Linked list and their various operations.
The pre-processor: macro statements.

D. List of practicals: (Minimum eight experiments should be conducted by students)

1. Write a program to find the two's complement of a given binary sequence.
2. Write a program to find the addition of two integer numbers by using 2's complement arithmetic.
3. Write a program to perform subtraction using 2's complement method.
4. Write a program to find the n-bits even/odd parity hamming code for the given binary sequences of r-bits.
5. Write a program to design the full adder logic and display the sum and carry of the provided binary inputs.
6. Write a program to design the truth table for any given function.
7. Write a program to find the shortest paths between each nodes of the given graph.
8. Write a program to design the traffic rules of a Junction Railway station consist with finite number of platforms.
9. Write a program to find the optimal weighted spanning tree from a graph.
10. Write a program to create a circular linked list and traverse the all the nodes.
11. Calculate the value of power factor, using two wattmeter methods, the first reading of wattmeter is X W and that of second wattmeter is Z W, when the both the reading is positive.
12. From the experimental data of OCC (Open Circuit Characteristics) and SCC (Short Circuit Characteristics) of a 1-Φ transformer, write a program for determining the parameters for the equivalent circuit.
13. Write a program to implement the Bernoulli's Equation.
14. Write a program to determination of Cantilever Beam – Concentrated load P at any point.
15. Write a program to determine the shear strength of soil by Triaxial and direct shear method.
16. Write a mini project to store all records of students and search by their name, roll number or registration number.
17. Write a program to create, edit, open, delete a file and perform different operations accordingly.
18. Write a program to backup one file to another file.
19. Write a program to merge two files.
20. Write a mini project to control mouse cursor and display whether left, right or scroll happens.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Open book and on line.
2. Practical Examination: Conduct Programming test and viva voice.

G. Reading lists:

Books

1. *Kerninghan and Ritchie , "The 'C' programming language", Prentice Hall.*
2. *Yashavant P. Kanetkar, "Let Us C", Infinity Science Press, 2008.*
3. *Herbert Schildt, "C: The Complete Reference", McGraw-Hill Education, 2000.*
4. *Balaguruswamy, "Programming In Ansi C, 5E", Tata McGraw-Hill Education, 2011.*
5. *Govil, Agrawal, Mathur & Pathak, "Computer Fundamentals and Programming in C", Jaipur Publication House(JPH)*
6. *M.T. Somashekara, "Programming in C", PHI Learning Pvt. Ltd., 2005.*
7. *Sinha&Sinha, "Foundations of Computing", BPB Publications, 2002.*
8. *J. B. Dixit, "Computer Fundamentals and Programming in C", Firewall Media, 2009.*
9. *Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 2014.*
10. *K. N. King, "C Programming: A Modern Approach", W.W. Norton, 2010.*
11. *Zed Shaw, "Learn C The Hard Way", Addison Wesley Professional, 2015.*
12. *Steve Oualline, "Practical C Programming, 3rd Edition", O'Reilly Media, Inc., 2003.*
13. *Ajay Mittal, "Programming In C: A Practical Approach", Pearson Education India, 2010.*
14. *A.P.Godse, D.A.Godse, "Computer Concepts and Programming in C", Technical Publications, 2008.*

Magazines:

1. *C/C++ Users, CMP Media LLC publication, United States.*
2. *EPS Software Corp/CODE Magazine, 6605 Cypresswood Drive, Suite 300 Spring, TX 77379.*

Journals:

1. *Science of Computer Programming:Methods of Software Design: Techniques and Applications, Elsevier, ISSN:0167-6423*
2. *Programming and Computer Software, Springer, ISSN: 0361-7688.*
3. *Dr. Dobb's Journal, United Business Media publication, United State,ISSN: 1044-789X*
4. *Journal of C Language, CMP Media LLC publication, United States*
5. *C vu Journal, ACCU, UK.*

Name of the Module: Environmental Science
Module Code: CHY 201
Semester: 2nd
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. imparting the knowledge to the students in the area of Environmental Engineering.
2. providing teaching and learning to make students acquainting with advanced science and technology in Environmental Science.
3. injecting the future scope and the research direction in the discipline of Environmental Engineering.

4. making students competent to the research and development in Environmental Engineering.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. adequately trained to become Scientist, trainers and Chemical Engineers.
2. skilled both to control and maintenance in Environmental pollution, waste water treatment and other related activities in Environmental Engineering.
3. be substantially prepared to take up prospective research assignments.

C. Subjects matter:

Unit-1

Environment: Concepts of Environment, Environmental gradients, Tolerance levels of environment factor, EU, US and Indian Environmental Law. Chemistry in Environmental Engineering: Chemistry of the atmosphere, combustion related air pollution, global environmental problems - ozone depletion, greenhouse effect, acid rain etc.

Ecological Concepts: Biotic and Abiotic components, Ecosystem Process: Energy transfer, Food Chain and Food Web, Water cycle, Oxygen cycle, Carbon cycle, Nitrogen cycle etc.,

Soil chemistry. Soil composition, properties, identification and classification. Noise pollution Effect of noise on people, rating systems, community noise sources and criteria, traffic noise prediction, noise control. Noise standards, measurement and control.

Unit – II

Waste Water Treatment: Water Treatment: water quality standards and parameters, Ground water. Water treatment processes, Pre-treatment of water, Conventional process, advanced water treatment process. DO and BOD of Waste water treatment process, primary and secondary treatment of waste water, Activated sludge treatment: Anaerobic digestion, Reactor configurations and methane production.

Water resources, characteristics of water, water pollutants, oxygen demanding wastes, surface water qua lity, groundwater quality, water treatment systems, biomedical wastes treatment technologies and dispos al options.

Unit – III

Solid waste, Definition and characteristics of industrial and hazardous wastes. Hazardous waste management, Solid Waste Management, Source classification and composition of MSW: Separation, storage and transportation, Reuse and recycling, Waste Minimization Techniques. Hazardous Waste Management, Hazardous waste and their generation, Transportation and treatment: Incinerators, Inorganic waste treatment. E.I.A., Environmental auditing, Hazardous substances and risk analysis: Hazardous substance legislation, risk assessment, hazard deific ation, potential carcinogens, toxicity testing in animals, human exposure assessment.

Unit-IV

Air quality standards, emission standards,emission standards, criteria pollutants, air pollution and meteo rology, atmospheric dispersion, emission controls. Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change –greenhouse gases, non-criteria pollutants, air pollution meteorology, Atmospheric dispersion. Industrial Air Emission Control. Flue gas desulphurization, NOx removal, Fugitive emissions.

D. Teaching/ Learning/ Practice pattern:

Teaching : 50%

Learning : 50%

(Teacher is to divide components for T/R/P)

E. Examination pattern:

1. Theoretical Examination: Open book and on line.

F. Reading lists:

Books:

1. *G. Kiely, "Environmental Engineering Irwin", McGraw Hill International Edition, 1997.*
2. *Arcadio P. Sincero & Gergoria A. Sincero, "Environmental Engineering", PHI*
3. *M. L. Davis and S. J. Masen, "Principles of Environmental Engineering and Science", McGraw Hill International Edition, 2004*
4. *Curringham & Saigo, "Environmental Science", TMH.*
5. *Gilbert M. Masters & Wendell P. Ela, "An Introduction to Environmental Engineering and Science", PHI Publication.*
6. *Gilbert M Masters, "Introduction to Environmental Engineering and Science".*
7. *J. G. Henry and G. W Heinke, "Environmental Science and Engineering".*
8. *M.L. Davis and D.A. cornwell, "Introduction to Environmental Engineering".*

Magazines:

1. *Applied Environmental Research Foundation*
2. *Environmental Science and Engineering*
3. *Climate Wire*
4. *Down to Earth*
5. *The Green Economist*
6. *Green Wire*

Journals:

1. *Journal of Environmental Science, Elsevier Publication*
2. *Environmental Science and Technology, ACS Publication*
3. *Energy and Environmental Science, RSC Publication*
4. *Environmental International, Elsevier Publication*

Name of the Module: Engineering Physics - II
Module Code: PHY 201
Semester: 2nd
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical & practical knowledge to the students in the area of Engineering Physics.
2. providing teaching and learning to make students acquainting with modern state-of-art of Engineering
3. injecting the future scope and the research direction in the field of Physics with specific specialization.
4. making students competent to design & development of Engineering Physics.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. adequately trained to become Engineers.
2. substantially prepared to take up prospective research assignments and will be substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Electricity: Coulombs law in vector form, Electrostatic field and its curl, Gauss's law in integral form and conversion to differential form, Electrostatic potential and field, Poisson's Eqn. Laplace's Eqn. (Application to Cartesian, Spherically and Cylindrically symmetric systems-effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady state current Dielectrics- concept of polarization.

Unit II:

Magnetostatics& time varying Field: Lorentz force, force on a small current element placed in a magnetic field, Biot-Savart law and its applications, divergence of a magnetic field, vector potential, ampere's law in integral form and conversion to differential form, Faraday's law of electromagnetic induction in integral form and conversion to differential form.

Electromagnetic theory: conception of displacement current, Maxwell 's field equations, Maxwell's wave equation and its solution for fee space, E.M wave in a charge free conducting media, skin depth, physical significance of skin depth, E.M. energy flow &poynting vector.

Unit III:

Quantum Mechanics: Wave particle duality, Compton effect, Photo electric effect, Black body radiation, Heisenberg's uncertainty relation, concept of wave packet**.** Conception of probability and probability density, operators, commutator, Formulation of quantum mechanics and basic postulates, Time dependent Schrodinger's equation, Formulation of Time independent Schrodinger's equation, physical interpretation of wave function, Free particle and particle in a box.

Unit IV:

Statistical Mechanics: Concept of energy levels and energy states. Microstates, macrostates and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Bose-Einstein statistics – Planck's law of blackbody radiation.

D. List of practicals: (Minimum six experiments are required to be performed)

1. Determination of dielectric constant of a given dielectric material.
2. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.
3. Determination of specific charge (e/m) of electron by J.J. Thomson's method.
4. Determination of Planck's constant using photocell.
5. Determination of Rydberg constant by studying Hydrogen/ Helium spectrum.
6. Determination of Stefan's radiation constant.

7. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
8. Determination of Hall co-efficient of semiconductors.
9. Determination of band gap of semiconductors
10. Use of carry Foster's bridge to determine unknown resistance

E. Teaching/ Learning/ Practice Pattern:

Teaching : 40%
Learning : 10%
Practice : 50%

F .Examination Pattern:

1. Theoretical Examination: Open book and on line.
2. Practical Examination: Conducting Experiment and Viva-Voce.

G. Reading lists:

Books:

1. Herbert Goldstein, Charles P. Poole and John Safko, " Classical Mechanics" 3rd edition, Pearson.

2. N. C. Rana and P. S. Joag, "Classical Mechanics", Tata McGraw Hill Education Private Limited, New Delhi.

3. D. Chattopadhyay and P. C. Rakshit, "Electricity and Magnetism" , New Central Book Agency (P) Ltd.

4. David J. Griffiths, "Introduction to Electrodynamics," 3rd edition, PHI Learning Private Limited.

5. W. H Hayt and J A Buck, "Engineering Electromagnetics" 7th edition, Tata McGraw Hill Education Private Limited, New Delhi.

6. Eisenberg and Resnick, "Quantum Physics", 2nd edition, Wiley India.

7. F. Reif, "Statistical Physics" Tata McGraw Hill Education Private Limited, New Delhi.

8. S. N. Ghoshal, "Atomic Physics" S. Chand

9. Beiser, Mahajan and Choudhury, " Concepts of Modern Physics" Tata McGraw Hill Education Private Limited, New Delhi.

10. A. B. Gupta, "Modern Atomic and Nuclear Physics" BOOKS and Allied (P) Ltd.

11. Jeremy Bernstein, Paul M. Fishbane and Stephen G. Gasiorowicz" Modern Physics" Pearson.

12. Richard P. Feynman, Robert B. Leighton and Matthew Sands, " The FEYNMAN Lectures on Physics" Vol. I to Vol. IV, Pearson

13. D. Chattopadhyay and P. C. Rakshit, "An Advanced Course in Practical Physics" New Central Book Agency (P) Ltd.

Magazines:

1. *Resonance*
2. *American Teacher*
3. *Scientific Physics*
4. *Physics Today*
5. *Physics For You*

6. *Physics Teacher (IPS)*
7. *Physics World (IoP-UK)*
8. *Physics News (IPA)*

Journals:

1. *Nature*
2. *Physical Review Letter*
3. *Physical Review A & B*
4. *Applied Physics Letters (APL)*
5. *Journal of Applied Physics (JAP)*
6. *American Journal of Physics*
7. *Proceedings of the National Academy of Sciences*
8. *Chemical Physics Letters*
9. *Journal of Physics: (Including A, B, C, D, E, F & G)*

Name of the Module: Digital Electronics & Logic Design
Module Code: ECE 201
Semester: 2nd
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to make the students to build a solid foundation about Boolean algebra
2. to make the students to study Digital Logic Gates and Circuits
3. to provide a clear foundation of Modern Digital System

B. Learning outcomes:

At the end of this module, students are expected to be able to

1. clear understanding & utilization of logic gates
2. design and develop of advanced TTL logic circuits
3. utilization of Combinational and Sequential circuits, Counters, ADC and DAC

C. Subject matter:

Unit I:

Number Systems: Decimal, Binary, Octal and Hexadecimal systems, conversion of a number from one base to another.

Codes: BCD, Excess- 3, Gray, Reflected, ASCII, EBCDIC.

Algebra for logic circuits: Logic variables; Logic constants; Logic functions- NOT, AND, OR, NAND, NOR, Ex-OR;

Combinational circuits: Full Adder / Subtractor, BCD Adder, LAC Adder, Comparator, Decoder, Encoder, Priority Encoder, MUX/DEMUX & there structures, Combinational logic design using ROM array, Applications of MSI designs.

Unit II:

Minimization Techniques & System Design: Basic models of sequential M/C, Analysis of Asynchronous and Synchronous circuits, Synthesis of completely and incompletely specified synchronous sequential M/Cs, Combination & Sequential Circuits. Boolean Algebra (including Shanon's expansion theorem and consensus theorem); Ven diagram representation, Canonical representations-min-term, max-term; Karnaugh map simplification, Quine Mc-clusky minimization. Minimization of Multiple Input and multiple Output system.Introduction to state machines.Classification of State Machines.State Machine Applications.Analysis of State Machine, State table, State Diagram, State Equation, State reduction and State assignment.

Unit III:

Other Gates & Circuits: Difference between combinational and sequential circuits,

Sequential Gates: Triggering of sequential logic circuits. Difference between flip flop and latch – Construction of RS, D, JK, JK master slave, T flip flops using basic gates, preset and clear signal,

Shift Registers: Serial in serial out – Serial in parallel out, Parallel in serial out, Parallel in parallel out, Universal Shift Registers & their Applications.

Counters: Asynchronous and synchronous counter, Ripple counter, Mod-N counter, Up-down counter, Ring counter, Johnson counter, Programmable counter – Applications. Design of Synchronous State Machine (including Counter) and Asynchronous state machine.

Unit IV:

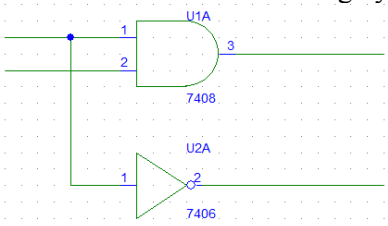
Logic Families: Comparative studies of different type of logic families like RTL, Diode logic, DTL, TTL, IIL,HTL,ECL, MOS & CMOS etc. with the following characteristics: (a) logic levels, (b) power dissipation, (c) fan in and fan out, (d) propagation delay, and, (e) noise immunity.

Data Converters: Digital to Analog Converters: Binary weighted resistor type, R-2R ladder type, Specifications and applications of DA converter. Analog to Digital Converter: Comparator type, Successive approximation type, Dual slope AD converter, Specifications and applications of AD converter.

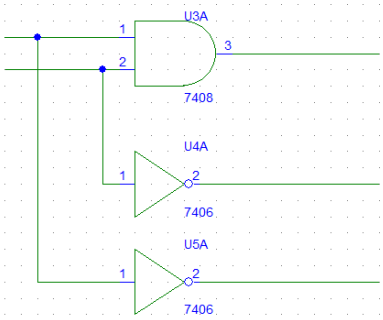
D. List of Experiments: (Minimum eight experiments should be conducted by students)

1. Study Data Hand Book and list atleast 5 chips for each of primary, secondary gates & flip-flops and draw their diagram with pin configuration.
2. Verify Truth Table of NOT, 2-input AND and 2-input OR gate thereby inference.
   i) Single line definition of multiple input AND & OR gate.
   ii) What is the primary difference between NOT gate from AND & OR gate.
3. Study the Truth Table of the following by circuits.

I.



II.



III. Compare the Truth Table of i) & ii) and that of AND gate and state inference.

4. Design Gray to Binary and Binary to GrayConverter & test
5. Design and test byte operated even parity generator & then convert it to odd parity generator.
6. Design and test (7,4) Hamming Code Generator and Error Correction decoder.
7. Design a Majority Gate and use it & a XOR gate to realize Adder Circuit & Verify.
8. With Serial Data input design a single circuit for test of >,<and =for two data.
9. Minimize the following logic system with SOP by tabular technique & implement the circuit.
   i) $f_1(A,B,C,D) = m_0 + m_1 + m_2 + m_3 + m_5 + m_6 + m_{10} + m_{13} + m_{15}$
   ii) $f_2(A,B,C,D) = m_0 + m_1 + m_2 + m_3 + m_5 + m_7 + m_{10} + m_{13}$
   iii) $f_3(A,B,C,D) = m_1 + m_2 + m_4 + m_5 + m_6 + m_7$
10. Minimize the following logic circuit defined in POS by tabular minimization technique:
    i) $f_1(X,Y,Z) = M_0.M_1.M_3.M_7$
    ii) $f_2(X,Y,Z) = M_0.M_1.M_2.M_6.M_7$
11. Write a C programmed to implement Tabular Technique for minimization of system as in problem (8)& (9)
12. Test Truth Table of
    i) S – R flip flop
    ii) J – K flip flop
    iii) D – flip flop
    iv) T – flip flop
13. Design 1 bit Read/Write memory with flip-flop and other logic gate & test.
14. Design Serial input & parallel output Shift register & test.
15. Design a binary counter & test.
16. Design one ADC &one DAC circuit & test.

E. Teaching/Learning/Practice pattern:

Teaching : 40%
Learning : 10%
Practice : 50%

F. Examination pattern:

1. Theoretical Examination: Open book/ Regular examination and on line test.
2. Practical Examination: Conducting Experiment and Viva-Voice.

G. Reading lists:

Books:

1. *J Crowe & B. Hayes-Gill, "Introduction to Digital Electronics", Newnes.*
2. *T. L. Floyd, "Digital Fundamentals"(9th Edition), Prentice Hall.*

3. *Taylor L. Both, "Introduction to Computer Engineering", 3rd Ed., John Wiley & Sons*
4. *R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill.*
5. *R L Morris & J R Miller, "Designing with TTL integrated circuits", McGraw Hill*
6. *C. H. Roth (Jr.), "Fundamentals of Logic design", Cengage Engineering.*
7. *M. Morris Mano, "Digital Logic Design"(3rd Edition), Prentice Hall.*
8. *Malvino& Leach, "Digital Principles and Applications", Tata McGraw Hill.*
9. *Anand Kumar, "Fundamentals of Digital Circuits", Prentice Hall.*

Magazines:

1. *Planet Analog,http://www.planetanalog.com/*
2. *IEEE Spectrum,http://spectrum.ieee.org/*
3. *Electronics for you, EFY Enterprises Pvt. Ltd, New Delhi.,http://www.electronicsforu.com/*
4. *Electropages,http://www.electropages.com/*

Journals:

1. *International Journal of Electronics Devices and Circuits.*
2. *IEEE Transaction on Computer-Aided Design of Integrated Circuits and System.*
3. *IEEE Transaction on Computer.*

Name of the Module: Historiography of Science & Technology
Module Code: HSS 201
Semester: 2nd
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. providing teaching with inclusive learning.
2. imparting theoretical lectures with case discussion.
3. making students aware of the importance of this subject in their future career.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. work with efficiency as they ae equipped with background knowledge on the subject.
2. perform much better in their workplace.

C. Subject matter:

Unit I

Introduction: Anoverview:definitions,Different approaches to the scientific explorations, to introduce humanity's endeavour behind science and its application over the centuries, characteristics of histography of science and technology.

Unit II

Motivation: Nature of drives, needs and motives, work motives, need of hierarchy theory and two factor theory of motivation, How to motivate the workers at work, factors effecting the morale of workers.

Lives of Eminent Scientists: To understand the Background, Opportunities, Achievements and Qualities in their efforts to become Scientist of first order.

Scientific Eras:Course of Civilization and Scientific Endeavour.

Contribution of science: Contribution to the present day World.

Unit III

Answers to the Criticism that Science has created a World full of Pollutions

D. **Teaching/Learning/Practice pattern:**

Teaching : 40%
Learning : 10%
Practice : 50%

E. **Examination pattern:**

1. Theoretical Examination: Open book/ Regular examination and on line test.

F**. Reading lists:**

Books:

1. *Agassi, Joseph. Towards an Historiography of Science, Wesleyan University Press. 1963.*
2. *Kragh, Helge An Introduction to the Historiography of Science, Cambridge University Press. 1990.*
3. *Kuhn, Thomas. The Structure of Scientific Revolutions, Chicago: University of Chicago, 1962 (third edn, 1996)*
4. *Gopalakrishnan, K.V. Inventors Who Revolutionised Our Lives, National Book Trust, India. 1999.*

Magazines:

1. *Science and Technology Magazine*
2. *Histograpghy of contemporary Science and Technology*
3. *Science News Letter*

Journals:

1. *Historiography in Graduate Technology*
2. *Innovation, Technology or History*
3. *Historiography of the Sciences*

Name of the Module: Basic Civil Engineering
Module Code: CE 202
Semester: 2nd
Credit Value: 2 [P=3, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the following objectives:

1. increasethe ability to understand Engineering Drawing.
2. learn to sketch and take field dimensions.
3. learn to take data and transform it into graphic drawings.

4. learn basic engineering drawing formats.
5. prepare the student for future Engineering positions.

B. Learning outcomes:

Upon completion of the subject:

1. student's ability to perform basic sketching techniques will improve.
2. students will be able to draw orthographic projections and sections.
3. student's ability to use architectural and engineering scales will increase.
4. students ability to produce engineered drawings will improve
5. student's ability to convert sketches to engineered drawings will increase.
6. students will become familiar with office practice and standards.

C. Subject matter:

Unit I:

Traditional Materials: stones, bricks, lime, cement, timber. Mortar: sand, cement mortar, mud mortar, special mortar, test on mortarConcrete: plain concrete, reinforced cement concrete, reinforced brick concrete

Unit II:

Metals as Building materials: Ferrous metals, aluminum, copper. Miscellaneous Building materials: Glass, plastics, bitumen, asbestos, paints, distempers, varnishes, solid and hollow concrete Blocks, Roofing and flooring tile

Unit III:

Superstructures: Types of superstructure based on the method of load transfer, walls, stone masonry, brick masonry, plastering, pointing, flooring, roof, doors and lintels, stairs.

Unit IV:

Surveying: Introduction to surveying-Object and uses of surveying, primary divisions of surveying, fundamental principles of surveying, classification of surveying, plans and maps, scales.

D. Teaching/Learning/Practice pattern:

Teaching : 40%
Learning : 10%
Practice : 50%

E. Examination pattern:

1. Theoretical Examination: Open book/ Regular examination and on line test.

F. Reading lists:

Books:

1. *Rakesh Roshan Beohar, "Basic Civil Engineering", Laxmi Publications.*
2. *Ramamurtham, "Basic Civil Engineering",Dhanpat Rai and sons*
3. *S SBhavikatti "Basic Civil Engineering" New Age international Publishers,*

Magazines:

1. *Civil Engineering and construction Review.*

Journals:

1. *ASCE.*

2. *Springer.*

Name of the Module: Workshop Practice-II
Module Code: ME 202
Semester: 2nd
Credit Value: 2 [P=3, T=0, L=0]
Module Leader:

A. Objectives:

The course is design to meet the following objectives:

1. acquire skills in basic engineering practice.
2. identify the hand tools and instruments.
3. acquire measuring skills.
4. acquire practical skills in the trades.
5. acquire practical skills in welding, carpentry, fitting.

B. Learning outcomes:

Upon completion of the subject, students should have the knowledge of:

1. workshop safety.
2. handling workshop tools, machines.
3. different welding types.
4. different carpentry joints.
5. different tools and their working principle.

C. Subject matter:

Unit I:

Bench work and Fitting: Tools for laying out, chisels, files, hammers, hand hacksaw, their specifications and uses, plumbing, Sheet metal Work.

Unit II:

Metal Joining: Definitions of welding, brazing and soldering processes, and their applications. Oxy acetylene gas welding process, equipment and techniques.Types of flames and their applications.Manual metal arc welding technique and equipment.AC and DC welding, electrodes, constituents and functions of electrodes.Welding positions. Types of weld joint.Common welding defects such as cracks, slag inclusion and porosity.

Unit III:

Machine Shop: Introduction, Basic Principles of Lathe, Shaper, Milling, Drilling, Grinding, Power Hacksaw,etc.

D. List of practicals:

1. To practice Gas welding using a 3mm thick mild steel plate. (Welding Shop)
2. To prepare a Lap joint and Butt joint by Gas Welding from 3mm thick mild steel plate (Welding Shop).
3. To practice Manual metal arc welding using a 5mm thick mild steel plate (Welding Shop).

4. To prepare various patterns using wood as a pattern material with the help of specific tools. (Carpentry Shop)
5. To perform various bench working operations like sawing, filling and finishing on a 5mm thick mild steel plate using specific tools (Fitting Shop).
6. To prepare jobs (Square, Angular and Semi Circular grooves) using 5mm mild steel plate using specific tools (Fitting Shop)
7. T-Lap joint and Bridle joint (Carpentry Shop).
8. Gas Welding practice on mild steel flat/sheet upto 3 mm thick.
9. Lap joint by Gas Welding (upto 3mm thick).
10. Manual Metal Arc Welding practice (upto 5mm thick).
11. Pattern Making. (Carpentry Shop)
12. Laying out (bench work); Sawing and Finishing by Filing.

E. Teaching/Learning/Practice pattern:

Teaching: 20%
Learning: 20 %
Practice: 60%

F. Examination pattern:

1. Job making.
2. Viva-voce.

G. Reading lists:

Books:

1. *M.L. Begeman and B.H. Amstead, "Manufacturing Process" John Wiley, 1968.*
2. *W.A.J. Chapman and E.Arnold, "Workshop Technology" Vol. 1, 2 & 3, CRC press Prentice Hall*
3. *B.S. Rghuwanshi, "Workshop Technology" Vol. 1 & 2 – Dhanpat Rai and Sons.*
4. *Hazra and choudhary"Workshop Technology" Vol. 1, 2, Media Promoters*
5. *VirenderNarula "Workshop Technology", S.K.Kataria& Sons*
6. *Anderson "Shop Theory" Mc Graw Hill.*
7. *H.S.Bawa, "Carpentry: A complete guide", Tata McGraw Hill.*
8. *R.Little, "Welding & Welding Technology", Tata McGraw Hill.*
9. *L.M.Gourd, "Principles of welding technology", Edward Arnold Publishers.*
10. *R.S.Parmer, "Welding processes and technology" Khanna publication.*

Magazines:

1. *International Metal Working News.*
2. *Industrial Distribution*

Journals:

1. *International Journal of Machine Tools and Manufacture*
2. *Journal of Manufacturing Science and Engineering, Transactions of the ASME*
3. *Journal of Manufacturing Technology and Research*

Name of the Module: Foreign Language (German/Chinese) (Audit)
Module Code: HSS202

Semester: 2nd
Credit Value: 2 [P=2, T=0, L=0]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. the French Language course accords to a method created for Indian students who are complete beginners in French and who wish to acquire verbal communication skills in current scenario.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. develop four skills in French i.e. Reading, Writing, Speaking, Comprehension

C. Subject matter:

Unit-I:

Social Interaction: Self Introduction, Introducing Friends, Family & persons Topical writing, Essays Description of persons Place, Things, Class, City, Country, House, Plan a Week-End, Excursion,

Unit-II:

Developing Writing Skills: Making Resume, Interviews Letter Writing, Rejecting or accepting proposals. Invitation, Dialogues, Tastes & Preferences

Unit-III:

Professional Dialogue: Conversational French between Known & Unknown people, Telephonic Conversation with Friends & Client

D. List of practicals:

1. Writing Resumes and Applications
2. Writing Memos
3. Reading Comprehension
4. Vocabulary
5. Presentation Skills
6. Group Discussion
7. Extempore

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination

G. Reading lists:

Books:

1. *Suggested book-Ailes Volume-II*
2. *G. Mauger: II (La Langue et de Civilisation francaise) Alliance française Paris Ile-de-France.*

Third Semester

Subject Code	Subject	P	T	L	Credit
MAS – 301	Discrete Mathematics	0	1	3	4
EE – 301	Circuit Theory & Networks	2	0	3	4
CSE – 301	Computer Organization & Architecture	2	0	3	4
CSE – 302	Data Structure & Algorithm	2	0	3	4
MAS – 302	Optimization Methods	0	0	3	3
CSE – 303 (I)	Object Oriented Programming	2	0	3	4
HSS – 301	Behavioural Science	0	0	2	2
		8	1	20	25

Name of the Module: Discrete Mathematics
Module Code: MAS 301
Semester: 3rd
Credit Value: 4[P=0, T=1, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
2. Apply logical reasoning to solve a variety of problems.

B. Learning outcomes:

Upon completion of the subject:

1. Students will have acquired greater precision in logical argument and have gained a core mathematical understanding of discrete mathematics.
2. Students will have learned and practised basic concepts of mathematical proof (direct proof, proof by contradiction, mathematical induction).
3. Students will be able to handle the standard logical symbols with some confidence.
4. Students will have learned elementary combinatorial and counting techniques and how to apply them to simple problems.
5. Students will be able to simplify complex mathematical expressions and apply general formulae to specific contexts.
6. Students will have learned how to state precisely and prove elementary mathematical statements and solve problems.
7. Students will have a basic understanding of information technology and its use in mathematical contexts.

C. Subject matter:

Unit I:

Sets and Properties: Finite and Infinite Sets, Combinations of Sets, Unaccountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion , Multisets, Propositions.

Permutations, Combinations, and Discrete Probability: The Rules of Sum and Product, Permutations, Combinations, Generation of Permutations and Combinations, Discrete Probability, Conditional Probability, Information and Mutual Information.

Relations and Functions: A Relational Model for Data Bases, Properties of Binary Relations, Equivalence Relations and Partitions, Partial Ordering, Relations and Lattices, Chains and Antichains, A Job-Scheduling Problem, Functions and the Pigeonhole Principle.

Unit II:

Graphs and Planar Graph: Basis Terminology, Multigraphs and Weighted Graphs, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, The Traveling Salesperson Problem.

Trees and Cut-Sets: Trees, Rooted Trees, Path Lengths in Rooted Trees, Prefix Codes, Binary Search Trees, Spanning Trees and Cut-Sets, Minimum Spanning Trees.

Unit III:

Discrete Numeric Functions and Generating Functions: Manipulation of Numeric Functions, Asymptotic Behavior of Numeric Functions, Generating Functions, Combinatorial Problem.

Recurrence Relations and Recursive Algorithms: Recurrence Relations, Linear Recurrence Relations with Constant Coefficients, Homogenous Solutions, Particular Solution.

Unit IV:

Group and Rings: Groups, Subgroups, Generators and Evaluation of Powers, Cosets and Lagrange's Theorem, Permutation Groups and Burnside's Theorem, Codes and Group Codes, Isomorphisms and Automorphisms, Homomorphisms and Normal Subgroups, Rings, Integral Domains, and Fields.

Boolean Algebra: Lattices and Algebraic Systems, Principle of Duality, Basic Properties of Algebraic System, Defined by Lattices, Distributive and Complemented Lattices, Boolean Lattices and Boolean Algebras, Uniqueness of Finite Boolean Algebras, Boolean Functions and Boolean Expressions, Propositional Calculus.

D. Teaching/ Learning/ Practice pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination pattern:

1. Theoretical Examination:

F. Reading lists:

Books:

1. *C.L. Liu, "Elements of Discrete Mathematics", Tata Mc Graw Hill, 2011.*
2. *Kolman B, Busby R. C, Ross S.C, "Discrete Mathematical Structures", PHI Learning, 2011.*
3. *D.S Malik & M.K.Sen, "Discrete Mathematical Structures: Theory & Applications", Thomson India Edition, 2004.*
4. *T. Veerarajan, "Discrete Mathematics", Mc Graw Hill, 2012.*
5. *N. Chandrasekaran, M. Umaparvathi, "Discrete Mathematics", PHI Learning Private Limited, 2010.*
6. *Babu Ram, "Discrete Mathematics", Pearson, 2011.*
7. *S. Lipschutz, Marc L. Lipson, "Discrete Mathematics", Schaum's outlines, Tata Mc Graw Hill, 2010.*
8. *Norman L. Biggs, "Discrete Mathematics", Oxford, 2nd Edition, 2009.*

9. *S. K. Chakraborty, B. K. Sarkar, "Discrete Mathematics", Oxford University Press, 2011.*
10. *K. D. Joshi, "Applied Discrete Structures", New Age International Publishers, 2003.*
11. *Rowan Garnier & John Taylor, "Discrete Mathematics", CRC Press,2011.*
12. *R. Johnsonbaugh, "Discrete Mathematics", Pearson, 2011.*

Magazines:

1. *Current Science (Indian Academy of Science)*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society)*
3. *Mathematical Spectrum(The University of Sheffield)*
4. *Mathematics Magazine (Mathematical Association of America)*
5. *+Plus magazine (University of Cambridge)*
6. *Ganithavahini (Ramanujan Mathematical Society)*
7. *Mathematics Today, London Metropolitan University.*

Journals:

1. *SIAM Journal on Discrete Mathematics.*
2. *Open Journal of Discrete Mathematics. Website: http:// www. scirp. org/journal/ojdm/*
3. *Discrete Mathematics, Elsevier.*
4. *Journal of Discrete Mathematics, Hindawi Publishing Corporation.*

Name of the Module: Circuit Theory & Networks
Module Code: EE 301
Semester: 3rd
Credit Value: 4 [P = 2, T = 0, L 3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. imparting knowledge to the students for classification of networks and systems based on different criteria and their analysis using network theorems,
2. applicability of Fourier and Laplace transforms in circuit analysis,
3. making familiar with SPICE modeling,
4. use of MATLAB for circuit solving procedures.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. Students will be made aware of the basic Network Theorems and their applicability in DC Bilateral Linear Circuits.
2. Students will be skilled both theoretically and practically for circuit modeling and study of various parameters related to circuit theory.
3. Students will be trained for use of simulation software like PSPICE and MULTISIM.

C. Subject matter:

Unit I:

Different types of systems &networks: continuous &Discrete, Fixed and Time varying, linearand Non-linear, Lumped and distributed, Passive &Active Networks &Systems and Laplace transform of impulse and sinusoidal steps waveforms for RL, RC, LC and RLC Circuits. Transient analysis of different electrical circuits with and without initial conditions, Fourier seriesand Fourier Transform.

Unit II:

Network theorems and their applications in circuit analysis, Formulation of network equations, Source transformations, Loop variable analysis and node variable analysis. Graph of network, concept of tree branch, tree link. Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials.

Unit III:

Two port networks, Open circuit Impedance and Short circuit Admittance parameters, Transmission parameters, hybrid parameters, and their inter-relations. Indefinite admittance matrix-their applications to the analysis of active network. Active filter analysis and synthesis using operational amplifier.

Unit IV:

SPICE: How SPICE works. Model statement, models for passive and active device, D.C. circuits analysis, small signal analysis, capacitors and inductors in D.C. Circuits, steady state and transient, plotting and printing, input and output Impedance, D.C. sensitivity analysis, harmonic decomposition (Fourier Series), Harmonic re-composition, voltage controlled components

D. List of Practicals:

1. Transient response in R-L and R-C Network: Spice, Simulation/hardware.
2. Transient response in R-L-C Series &Parallel circuits Network: Simulation/hardware.
3. Determination of Impedance (Z) and Admittance(Y) parameters of two port network.
4. Frequency response of LP and HP filters.
5. Frequency response of BP and BR filters.
6. Generation of Periodic, Exponential, Sinusoidal, Damped sinusoidal, Step, Impulse, Ramp signals using MATLAB in both discrete and analog form.
7. Evaluation of convolution integral, Discrete Fourier transform for periodic &non-periodic signals and simulation of difference equations using MATLAB.
8. Representation of poles and zero sine-plane, determination of partial fraction expansion in z
9. Domainand cascade connection of second order system using MATLAB
10. Determination of Laplace transform and inverse Laplace transformation using MATLAB
11. Spectrum analysis of different signals

E. Teaching/Learning/Practice pattern:

Teaching: 40%
Learning: 10%
Practice : 50%
(Teacher is to divide components for T/R/P)
(Some industrial experts will deliver lectures)

F. Examination Pattern:

1. Theoretical Examination : Written
2. Practical Examination: Conducting experiments and viva-voce.

G. Reading lists:

Books:

1. Sudhakar: Circuits &Networks: Analysis &Synthesis 2/e TMH New Delhi
2. ValkenburgM.E.Van,"NetworkAnalysis", Prentice Hall.
3. Engineering circuit analysis with PSPICE and probe-Roger
4. EnggCircuit Analysis: Hayt6/eTataMcgraw-Hill
5. A.Chakravarty: Networks, Filters &Transmission Lines
6. D. Chattopadhyayand P.C. Rakshit: ElectricalCircuits
7. A.V. Oppenheimer and A.S.Wilsky: Signals &Systems, PHI
8. R.V.Jalgaonkar.: Network Analysis &Synthasis. EPH.
9. Sivandam-Electric Circuits Analysis.Vikas
10. Reza F.M. and SeelyS., "Modern Network Analysis",Mc.GrawHill Book Company
11. Roy Choudhury D., "Networks and Systems", New Age International Publishers.
12. KuoF.F., "Network Analysis &Synthesis", John Wiley &Sons.

Magazines:

1. IEEE Xplore
2. Electrical India Magazine

Journals:

1. Circuits and Systems, IEEE Transactions
2. Circuits, devices and Systems, IET.

Name of the Module: Computer Organization & Architecture
Module Code: CSE 301
Semester: 3rd
Credit Value: 4[P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. helping the students to develop an understandthe nature and characteristics of the organisation and design of the modern computer systems,
2. focusing on the organisation &operation of the CPU. The Intel Pentium CPU will be used as the main case study.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand the key concepts that are likely to be included in the design of any modern computer system,
2. understand and to apply the basic metrics by which new and existing computer systems may be evaluated,

3. understand and to evaluate the impact that languages, their compilers and underlying operating systems have on the design of computer systems,
4. understand and to evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems,
5. demonstrate the techniques needed to conduct the design of a computer ,
6. examine different computer implementations and assess their strengths and weaknesses.

C. Subject matter:

Unit I:

Fundamentals of Computers: Digital computers, layers in computer system, types of computers, history of computers

Data representation and computer arithmetic: Data types, complement, fixed point representation, floating point representation, multiplication and division of sign and unsign inters.

Unit II:

Microoperation and design of arithmetic logic unit: Register transfer micro operation, bus transfer, memory transfer, arithmetic micro operation, logic micro operation, logic unit, shift unit, design of arithmetic and logic unit.

Instruction set: Instruction code, register, computer instruction, timing and control, instruction cycle, instruction formats, CPU organization, instruction length, addressing standard, addressing mode, instruction set, RISC, CISC, case study of RISC.

Unit III:

Design of control unit: hardware control design, microprogrammed control.

Memory organization: memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

Unit IV:

Input-output organization: peripheral device, I/O interface and I/O driver, synchronous and asynchronous data transfer, modes of data transfer, priority interrupt, DMA, input- output processor.

Parallel processing: performance measurement of computer, parallel computer structure, general classification of computer architecture, pipelining, vector processing, multiprocessor system, flow computers.

D. List of practical's:

1. Realization of different circuits using MUX.
2. Design of BCD adder.
3. Design of BCD subtractor.
4. Four bit CPU design using few instructions.
5. Design of ALU using bit dice ALU
6. Design of timer circuit/ control

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *M.M. Mano, "Computer System Architecture", Pearson Education.*
2. *C. Hamacher, Z. Vranesic, "Computer Organisation", Tata Mcgraw Hill, 2011.*
3. *M. Jain, S.Jain, V. Pillai, "Computer Organization and System Software", BPB Publications, 2003.*
4. *P. Pal Chaudhuri, "Computer Organisation & Design", PHI Learning Private Ltd., 2009.*
5. *J. P.Hayes, "Computer Architecture & Organisation", McGraw Hill, 1998*
6. *T. K. Ghosh&A. J. Pal,"Computer Organization & Architecture", Tata McGraw-Hill,*
7. *A. S. Tanenbaum, T. Austin, "Structured Computer Organisation", Pearson, 2013.*
8. *M. Rafiquzzaman,"Computer Architecture", Prentice Hall of India.*

Magazines:

1. *IEEE Micro Magazine, IEEE Computer Society, United State.*

Journals:

1. *IEEE Transactions on Computers, IEEE, Computer Society, United State.*
2. *ACM Transactions on Computing Systems (TECS), ACM New York, United State.*
3. *Journal of Systems Architecture, Elsevier, Netherlands*

Name of the Module: Data Structure & Algorithm
Module Code: CSE 302
Semester: 3rd
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. designing principles of algorithms and data structures,
2. learningefficiency and scaling of algorithms,
3. learningessential algorithms in computing,
4. understandinggeneric data structures for common problems.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. assess performance efficiency of sequential algorithms,
2. design data structures to enable algorithms and design sequential algorithms for performance,
3. implement designing algorithms and corresponding data structures using object oriented programming languages,
4. demonstrate deployment of essential data structures such as lists, stacks, queues, and trees,
5. demonstrate the use of algorithm design methods such as divide and conquer.

C. Subject matter:

Unit I:

Introduction: Basic concept of data, structures and pointers.
Arrays: Representation, implementation, polynomial representation, limitations.

Unit II:

Recursion - Design of recursive algorithms, Tail Recursion, When not to use recursion, Removal of recursion.
Linked List: Static and dynamic implementation. Single, double, circular, multiple linked lists.
Stack, queue, matrices.

Unit III:

Hash Tables: Hash tables implementation. Hashing techniques, single, double.
Storage Management: Memory Management techniques, garbage collection.
Trees: Binary trees, tree traversal, binary search trees, static and dynamic implementation.AVL tree,B+ tree, B tree, tree operations: insert, delete, and search.
Heaps: Implementation, sorting etc.
Sorting and Searching: Different sorting techniques. Insertion sort, selection sort, bubble sort, radix sort, quick sort, merge sort, heap sort.

Unit IV:

File Structures - Sequential and Direct Access. Relative Files, Indexed Files - B+ tree as index, Multi-indexed Files, Inverted Files, Hashed Files.
Graphs: Representation of graphs, BFS, DFS sort.

D. List of practicals: (Minimum eight experiments should be conducted by students)

1. Experiments should include but not limited to: Implementation of array operations.
2. Implementation of Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem : Evaluation of expressions operations on Multiple stacks & queues:
3. Implementation of linked lists: inserting, deleting, and inverting a linked list. Implementation of stacks & queues using linked lists. Eg, Railway ticketing system, CD's in the case wearing bangles.
4. Implementation of polynomial addition, polynomial multiplication,sparse Matrices: multiplication, addition. Recursive and Non recursive traversal of Trees
5. Implementation of threaded binary tree traversal.
6. Application of Trees.
7. Application of sorting.
8. Implementation of different types of searching techniques like linear search, binary search with real life analysis.
9. Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.
10. Implementation of recursive function using Tower of Hanoi.
11. Implementation of External memory data structure using B tree.
12. Implementation of AVL tree.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Open book and on line.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *Seymour Lipschutz, "Data Structure", Schaum's Outlines, Tata McGraw-Hill Education, 2011.*
2. *P. S. Deshpande, O. G. Kakde,"C & Data Structures", Charles River Media, 2004.*
3. *Aho Alfred V, Hopperoft John E., UIlman Jeffrey D, "Data Structures and Algorithms", Addison Wesley, 1998.*
4. *Adam Drozdek, "Data Structures and Algorithms in C++",Cengage Learning, 2012, 4th ed..*
5. *Heileman, "Data Structures, Algorithms & Object Oriented Programming", Tata Mcgraw-Hill Publishing Company Limited.*
6. *MariappaRadhakrishnan, "Data Structures Using C", BPB Publications, 2001.*
7. *Mark Allen Weiss, "Algorithms, Data Structures, and Problem Solving with C++", Addison-Wesley Publishing Company, 1996.*
8. *Horowitz Ellis &SartajSahni, "Fundamentals of Data Structures", Galgotria Publications*
9. *Aaron M. Tanenbaum, "Data Structures using C", Pearson Education.*
10. *Ajay Agarwal, "Data structure Through C", Cyber Tech Publications, 2005.*
11. *Mary E. S. Loomis ,"Data management and file structures", Prentice Hall PTR, 1989, 2, illustrated.*

Magazines:

1. *MSDN Magazine, Microsoft and 1105 Media, USA*
2. *IBM system Magazine, IBM, USA*

Journals:

1. *IEEE Transactions on Computers, IEEE, Computer Society, United State*
2. *ACM Transactions on Embedded Computing Systems (TECS), ACM, United State*
3. *Journal of Systems Architecture, Elsevier, Netherlands*
4. *Journal of Discrete Algorithms (JDA) , Elsevier, Netherlands*

Name of the Module: Optimization Methods
Module Code: MAS 302
Semester: 3rd
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to make the students introduction of the methods of Operations Research,
2. emphasize the mathematical procedures of nonlinear programming search techniques,
3. a scientific approach to decision making, which seeks to determine how best to design and operate a system, usually under conditions requiring the allocation of scarce resources.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. identify and develop operational research models from the verbal description of the real system & use mathematical software to solve the proposed models,
2. understand the mathematical tools that are needed to solve optimisation problems,

3. develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

C. Subject matter:

Unit I:

Introduction: Introduction to OR modelling approach and various real life situations. Linear programming problems and applications, various components of LP problem formulation, Solving Linear Programming problem using simultaneous equations and Graphical Method, Simplex Method and extensions, Sensitivity analysis - Duality theory, Revised Simplex Transportation and assignment problems.

Unit II:

Network Analysis: Shortest Paths, Maximal Flow including PERT-CPM. Integer programming concepts, formulation, solution and applications.

Dynamic Programming: Modelling, Optimization, Replacement.

Unit III:

Game Theory: Introduction, Decisions under risk, Decisions under uncertainty.

Unit IV:

Nonlinear Optimization: Introduction, method of Lagrange multipliers, Karush-Khun-Tucker theory, numerical methods for nonlinear optimization, convex optimization, quadratic optimization.

D. Teaching/ Learning/ Practice pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination pattern:

1. Theoretical examination and open book examination.

F. Reading lists:

Books:

1. *Hamdy A. Taha, "Operations Research", Ninth edn., Pearson, New Delhi, 2012.*
2. *V.K. Kapoor, "Operations Research", 7th edn., S Chand& Co, 2001.*
3. *Kanti Swaroop, P. K. Gupta & Man Mohan, "Operations Research", Sultan Chand, 1978.*
4. *Hadley G., "Linear Programming", Narosa Publishers, 1987.*
5. *Hillier & Lieberman—Introduction to Operations Research, 7/e (with CD),TMH*
6. *Hiller F. and Leibermann G. J., "Operation Research", Holder Day Inc, 1974.*
7. *Operations Research – Schaum outline series, MH*
8. *Chakraborty & Ghosh, "Linear Programming & Game Theory", Moulik Library, 2013.*
9. *S. Kalavathy, "Operations Research", Vikas Publishing House Pvt. Ltd, 4th edn, 2013.*

Magazines:

1. *Current Science (Indian Academy of Science)*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society)*
3. *Mathematical Spectrum(The University of Sheffield)*
4. *Mathematics Magazine (Mathematical Association of America)*
5. *+Plus magazine (University of Cambridge)*
6. *Ganithavahini (Ramanujan Mathematical Society)*
7. *Mathematics Today, London Metropolitan University.*

Journals:

1. *European Journal of Operational Research.*
2. *Journal of the Operational Research Society of India.*
3. *American Journal of Operations Research, Scientific Research.*
4. *Journal of Optimization, Hindwai Publishing Corporation.*

Name of the Module: Object Oriented Programming
Module Code: CSE 303
Semester: 3rd
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:
Module Tutor(s):

A. Objectives:

The course is designed to meet the objectives of:

1. learning to program in an object-oriented programming language,
2. focusing those who already have some experience with another programming language, and who now wish to move on to an object-oriented one,
3. learning object-oriented programming language namely, Java.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. explain the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism using Java,
2. use an object oriented programming language, and associated class libraries, to develop object oriented programs using Java,
3. design, develop, test, and debug programs using object oriented principles in conjuncture with an integrated development environment using Java.

C. Subject matter:

Unit I:

Introduction: Basic features & concepts of Object Oriented Programming, (OOP), Benefits, Languages and Applications of OOPs.

Tokens, Expressions and Control Structures: Tokens, Keywords, Identifiers & Constants, Basic data types, User-defined data types, Derived data types, Memory management operators, Manipulators, Expressions, Operator overloading, Control structures

Functions in C++: Main function, function prototyping, call by reference, inline functions, default functions, function overloading

Classes and Objects: Specifying a class, defining member functions, private member functions, array within a class, memory allocation for objects, arrays of objects, objects as function arguments, returning objects, pointers to members, local classes

Unit II:

Constructors &Destructors: Constructors, Parameterized constructors, Constructors with default arguments, Dynamic initialization of objects, Dynamic constructors & destructors

Operator Overloading & Type Conversion: Definition & rules of overloading operators, Overloading binary & unary operators

Inheritance: Definition, single, multilevel, multiple, hierarchical and hybrid inheritance, virtual base classes, abstract classes

Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to objects and derived classes, virtual functions, Pure virtual functions.

Unit III:

Templates: Class templates, function templates, overloading of function templates, member function templates

Strings: Creating and manipulating string objects, accessing characters in strings.

Java Basics: History of Java, Java buzzwords, datatypes, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces. Exploring packages – Java.io, java.util.

Exception handling and multithreading: Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Unit IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grib bag.

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing-JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Networking: Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, Java .net package Packages – java.util

D. List of practicals: (Minimum eight experiments should be conducted by students)

1. Write a program in Java to demonstrate class, constructor, overloading, inheritance, overriding
2. Write a program in Java to demonstrate wrapper class, vectors, arrays
3. Write a program in Java to demonstrate interfaces- multiple inheritance, extending interfaces
4. Write a program in Java to demonstrate packages
5. Write a program in Java to demonstrate multithreaded programming, handling errors and exceptions, applet programming and graphics programming
6. Write a program in Java to demonstrate Java SWING application.
7. Write a program in Java to demonstrate Client Server Programming.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%

Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination and online Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *J.Nino and F.A. Hosch, "Introduction to Programming and Object-Oriented Design Using Java", John Wiley & Sons, Incorporated, 2001.*
2. *T. Budd, "An Introduction to Object-Oriented Programming", third edition, Pearson education.*
3. *Y. Daniel Liang, "Introduction to Java programming", Pearson Education, 2014.*
4. *R. A. Johnson, "An Introduction to Java Programming and Object-Oriented Application Development", Thomson.*
5. *Cay.S. Horstmann and Gary Cornell, "Core Java 2",Volume 1 Fundamentals, seventh Edition, Sun Microsystems Press, 2005.*
6. *Ken Arnold, James Gosling, David Holmes, "The Java TM Programming Language", Addison-Wesley, 2006.*
7. *Kathy Sierra, Bert Bates, "Head First Java", O'reilly.*
8. *Bruce Eckel, "Thinking In Java", Prentice Hall.*
9. *Khalid Azim Mughal, Rolf Rasmussen, "A Programmer's Guide to Java Certification: A Comprehensive Primer", Pearson Education.*
10. *Alan Vermeulen, Scott Ambler,"The elements of Java style",Cambridge University Press 2000.*

Magazine:

1. *Java Magazine by Oracle, Oracle, California, United States.*

Journals:

1. *JAVA Developer's Journal, SYS-CON Publications, Chicago, United State.*
2. *TechJava - Journal on Java Technology, Addison-Wesley, Boston United State.*

Name of the Module: Behavioural Science
Module Code: HSS 301
Semester: 3rd
Credit Value: 2 [P=0, T=0, L=2]

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical lectures with case discussion.
2. providing teaching with inclusive learning.
3. making students aware about the importance of this subject in their future career.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. work with efficiency as they had knowledge of the subject.
2. with the backup knowledge their performance will definitely bemuch better in their workplace.

C. Subject Matter:

Unit I

Behavioral Science: An overview: definitions, Man the critical factor, Behavioral science and its historical development.

Motivation: Nature of drives, needs and motives, work motives, need hierarchy theory and two factor theory of motivation, how to motivate the workers at work, factors effecting the morale of workers.

Unit II

Industrial Sociology: Concept and Definitions; Importance for Engineers; Growth; Criticism of the Hawthorne Studies; Nature and scope of Industrial sociology, Industry and Community, Industry and Tradition in India.

Society and Technical Change: Concept of social change, meaning and definitions of social change, nature of social change. Factors such as Natural, Cultural, Economic, Planning, Technological, Indian Information Technology Scenario, Effect of Technology on Social Institutions.

Society and Environment: Meaning and Definitions, Characteristics, Classification of Environment, Physical Environment and its Influence, Social Environment and its some basic elements, Environment in Industry, Illumination, Noise, Atmospheric Conditions, Music and Colour.

Unit III

Groups: Meaning and Definitions, types of Groups, characteristics, functions of formal and informal groups, merits and demerits of informal groups.

Unit IV

Human relations: Historical overview, definitions, early and later approaches to human relations, strategies for establishing healthy human relations.

Labour management relations: Industrial relations; meaning, objectives and definitions, Dunlop's theory of industrial relations, Psychological and Gandhian approach to industrial relations, industrial relations in Japan and India, industrial relation in coming years, challenges of coming years, new dimensions of industrial relations, the ways of industrial peace. Trade unions; meaning and definitions, functions of Indian trade Unions, recent emerging trends in Indian trade unions.

D. Teaching/ Learning Pattern:

1. Teaching : 50%
2. Learning/ case presentation : 30%
3. Assignment : 10%
4. Attendance : 10%

E. Examination Pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading List:

Books:

1. *Wendell L. French, Human Resource Management(4th ed.) Proston: Honshto Mittin, 1998.*
2. *H.Fayol, Industrial and General administration, Paris: Dunod, 1916.*
3. *Mintzberg, the Nature of Managerial Works: Upper Saddle River, N.J Printice Hall,1973.*

4. Fred N.Ker Linger, Behavioral Research: A conceptual Approach, New York:Holt Rinehart and Winston,1979
5. Milter William R. And Stephen Rollnick, Motivational Interviews, (3rd ed.), Sept 7,2012.
6. Daniel Kahnmen, Thinking Fast and Slow, April 2, 2013.
7. Elizabeth, D. Hutchison. Essentials of Human Behaviour, September 3,2013.
8. Susan P.Robbins, Pranal Chatterjee, Edward R.Canda, Contemporary Human Behaviour Theo ry, 2013.

Magazines:

1. *Leadership Quarterly*
2. *HBR Magazine*

Journals:

1. *Journal of Behavioural Sciences*
2. *Behavioural and Brain Sciences*
3. *Journal of Contextual Behavioural Sciences*
4. *Harvard Business Review*

Fourth Semester

Subject Code	Subject	P	T	L	Credit
MAS – 401	Stochastic Process	0	1	3	4
CSE – 401	Formal Languages & Automata Theory	0	0	3	3
CSE – 402	Advanced Computer Architecture	2	0	3	4
CSE –403	Design & Analysis of Algorithm	2	0	3	4
CSE – 404	System Software & Administration	2	0	3	4
EE – 405	Control System Engineering	2	0	3	4
HSS – 401	Entrepreneurship & Innovation	0	0	3	3
		8	1	21	26

Name of the Module: Stochastic Process
Module Code: MAS 401
Semester: 4th
Credit Value: 4 [P=0, T=1, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical knowledge and practical application to the students in the area of Stochastic Process,
2. introducing the basic notions of probability theory and develops them to the stage where one can begin to use probabilistic ideas in statistical inference and modeling, and the study of stochastic processes,
3. providing confidence to students in manipulating and drawing conclusions from data and provide them with a critical framework for evaluating study designs and results,
4. injecting future scope and the research directions in the field of stochastic process.

B. Learning outcomes:

Upon Completion of the subjects:

1. students will add new interactive activities to fill gaps that we have identified by analyzing student log data and by gathering input from other college professors on where students typically have difficulties,
2. students will add new simulation-style activities to the course in Inference and Probability,
3. students will be substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Probability:

Theory of Probability: Random Experiment**,** Sample space; Random Events; Probability of events. Axiomatic definition of probability; Frequency Definition of probability; Finite sample spaces and equiprobable measure as special cases; Probability of Non-disjoint events (Theorems). Counting techniques applied to probability problems; Conditional probability; General Multiplication Theorem; Independent events; Bayes' theorem and related problems.

Random variables (discrete and continuous); Probability mass function; Probability density function and distribution function. Distributions: Binomial, Poisson, Uniform, Exponential, Normal, t and $\chi 2$. Expectation and Variance (t and $\chi 2$ excluded); Moment generating function; Reproductive Property of Binomal; Poisson and Normal Distribution (proof not required). Transformation of random variables (One variable); Chebychev inequality (statement) and problems.

Unit II:

Approximation Theory: Binomial approximation to Poisson distribution and Binomial approximation to Normal distribution (statement only); Central Limit Theorem (statement); Law of large numbers (Weak law); Simple applications.

Unit III:

Statistics:

Sampling Theory: Population; Sample; Statistic; Estimation of parameters (consistent and unbiased); Sampling distribution of sample mean and sample variance (proof not required).

Estimation Theory: Point estimate, Maximum likelihood estimate of statistical parameters (Binomial, Poisson and Normal distribution). Interval estimation.

Testing of Hypothesis: Simple and Composite hypothesis; Critical Region; Level of Significance; Type I and Type II Errors; Best Critical Region; Neyman-Pearson Theorem (proof not required); Application to Normal Population; Likelihood Ratio Test (proof not required); Comparison of Binomial Populations; Normal Populations; Testing of Equality of Means; $\chi 2$—Test of Goodness of Fit (application only).

Unit IV:

Correlation and Regression: Simple idea of Bivariate distribution; Correlation and Regression; and simple problems

D. Teaching/Learning/Practice pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

(Teacher is to divide components for T/L/P)

E. Examination pattern:

1. Theoretical Examination & Open book examination.

F. Reading lists:

Books:

1. *P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall, 2000.*
2. *Khazanie, Ramakant, "Basic Probability Theory and Applications Santa Monica", CA: Goodyear, 1976.*
3. *Ross, Sheldon M, "Introduction to Probability Models", New York, NY: Academic Press, 1972, 1985. Third Edition.*
4. *S. Ross, "A First Course in Probability", 6th Ed., Pearson Education India, 2002.*
5. *Cramer, Harald. "Random Variables and Probability Distributions", New York, NY: Cambridge University Press, 1970. Third Edition.*
6. *Parzen, Emanuel. "Modern Probability Theory and Its Applications" New York, NY: John Wiley, 1960.*
7. *Rothschild, V. and Logothetis, N. "Probability Distributions", New York, NY: John Wiley, 1986.*
8. *Bailey, Norman T.J. "The Elements of Stochastic Processes with Applications to the Natural Sciences" New York, NY: John Wiley, 1990.*

9. *Bhat, U. Narayan. "Elements of Applied Stochastic Processes", New York, NY: John Wiley, 1984. Second Edition.*
10. *Karlin, Samuel and Taylor, Howard M. "A First Course in Stochastic Processes", New York, NY: Academic Press, 1975. Second Edition.*
11. *Karlin, Samuel and Taylor, Howard M. "A Second Course in Stochastic Processes" New York, NY: Academic Press, 1981.*
12. *J. Medhi, "Stochastic Processes", 3rd Ed., New Age International, 2009.*
13. *Ross, Sheldon M. "Stochastic Processes", New York, NY: John Wiley, 1983.*
14. *N.G. Das, "Statistical Methods", Vol-I & Vol-II, Mc Graw Hill.*
15. *Murray R. Spiegel, "Probability and Statistics", McGrawHll, Schaum's Outline Series.*

Magazines:

1. *Current Science (Indian Academy of Science)*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society)*
3. *Mathematical Spectrum(The University of Sheffield)*
4. *Mathematics Magazine (Mathematical Association of America)*
5. *+Plus magazine (University of Cambridge)*
6. *Ganithavahini (Ramanujan Mathematical Society)*

Journals:

1. *Advances in Probability and Related Topics (Marcel Dekker)*
2. *Annals of Applied Probability (Institute of Mathematical Statistics)*
3. *Annals of Probability (Institute of Mathematical Statistics)*
4. *Communications on Stochastic Analysis*
5. *Electronic Journal of Probability*
6. *Séminaire de Probabilités (Lecture Notes in Mathematics, Springer-Verlag)*
7. *Stochastic Modelling and Applied Probability (Springer-Verlag)*
8. *Stochastic Processes and their Applications*
9. *Stochastics: An International Journal of Probability and Stochastic Processes (Taylor & Francis)*
10. *Theory of Probability and its Applications (SIAM)*
11. *Stochastic Processes and their Applications, Elsevier.*
12. *Stochastics: An International Journal of Probability and Stochastic Processes, Taylor Francis Online.*
13. *International Journal of Stochastic Analysis, Hindwai Publishing Corporation.*
14. *Journal of the American Statistical Association.*
15. *Journal of the Royal Statistical Society, Series A, Statistics in Society.*
16. *Journal of the Royal Statistical Society, Series B, Statistical Methodology.*
17. *Journal of the Royal Statistical Society, Series C, Applied Statistics.*
18. *SANKHA, ISI, Kolkata.*

Name of the Module: Formal Language and Automata Theory
Module Code: CSE 401
Semester: 4th
Credit Value: 3 [P=0, T=0, L=3]

Module Leader:

A. Objectives:

The course is designed to meet with the objectives of:

1. providing a deeper understanding of programming languages design motivations and semantics,
2. facilitating students to select and use the most appropriate language for a given task and write correct programs,
2. illustrating language processing techniques: compilation and interpretation.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand and apply formal notations via regular expressions and grammars, as well as their recognizers (finite automata, push-down automata),
2. provide relevant formal definitions for given languages,
3. discuss virtual machines and intermediate languages trade-offs,
4. understand and apply basic language processing techniques: compilation and interpretation.

C. Subject matter:

Unit I:

Instruction to the theory of formal languages, Chomsky Hierarchy of languages, : Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, DFA, NFA, equivalence of DFA and NFA, NFA with e-moves, regular sets & regular expressions : equivalence with finite automata, NFA from regularexpressions, regular expressions from DFA, two way finite automata equivalence with one way, equivalence of Moore & Mealy machines, applications of finite automata.

Finite State Machines : Definition, concept of sequential circuits, state table &state assignments, concept of synchronous, asynchronous and liner sequential machines.

Unit II:

Finite State Models : Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, merger table, Finite memory, definite, information loss less & inverse machines : testing table & testing graph.

Unit III:

Closure Properties of Regular Sets : Pumping lemma & its application, closure properties minimization of finite automata : minimization by distinguishable pair, Myhill-Nerode theorem.

Context Free Grammars: Introduction, definition, derivation trees, simplification, CNF & GNF.

Pushdown Automata : Definition, moves, Instantaneous Descriptions, language recognised by PDA, deterministic PDA, acceptance by final state & empty stack, equivalence of PDA and CFL.

Unit IV:

Closure Properties of CFLs : Pumping lemma & its applications, ogden's lemma, closure properties, decision algorithms.

Introduction to Z. Regular language properties and their grammars.Context sensitive languages.

Turing machine and the concept of computability, halting problem of TM.

D.Teaching/ Learning/ Practice pattern:

Teaching: 60%
Learning: 40%
Practice: 0%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *J. E. Hopcroft and J. D. Ullman, "Introduction to Automata Theory, Languages & Computation",2nd Edition, Pearson education.*
2. *K.L. P Mishra & N. Chandrasekharan, "Theory of Computer Science: Automata, Languages and Computation",3rd Edition, Prentice Hall India.*
3. *H. R. Lewis and C. H. Papadimitrou, "Elements of the theory of Computation", Pearson Education, 2005.*
4. *Richard Y. Kain, "Theory of Automata & Formal Language", McGraw Hill.*
5. *ZviKohavi, "Switching and Finite Automata Theory", 2nd edition, Tata McGraw-Hill.*
6. *Peter Linz, "An Introduction to Formal Languages and Automata", Jones & Bartlett Publishers.*
7. *Howard Straubing , "Finite Automata, Formal Logic, and Circuit Complexity", Springer.*
8. *John Carroll and Darrell Long, "Theory of Finite Automata:With an Introduction to Formal Languages", Prentice Hall, 1989.*

Magazines:

1. *Formal language theory.*
2. *JFLAP (Java Formal Languages and Automata Package).*

Journals:

1. *Journal of Automata, Languages and Combinatorics, Otto-von-Guericke University Magdeburg , Germany.*

Name of the Module: Advanced Computer Architecture
Module Code: CSE 402
Semester: 4th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of:

1. helping the student develop an understanding of the nature and characteristics of the organisation and design of the modern computer systems,
2. focusing on the organisation &operation of the CPU. The Intel Pentium CPU will be used as the main case study.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand the key concepts that are likely to be included in the design of any modern computer system,

2. understand and apply the basic metrics by which new and existing computer systems may be evaluated,
3. understand and evaluate the impact that languages, their compilers and underlying operating systems have on the design of computer systems,
4. understand and evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems,
5. demonstrate the techniques needed to conduct the design of a computer to examine different computer implementations and assess their strengths and weaknesses.

C. Subject matter:

Unit I:

Computer performance analysis: classification of computer architecture: SISD,SIMD,MISD,MIMD.

Instruction level parallelism: Review of Pipelining, Examples of some pipeline in modern processors, pipeline hazards, data hazards, control hazards. Techniques to handle hazards, performance improvement with pipelines and effect of hazards on the performance, Super scaler and VLIW architecture.

Unit II:

Vector processors: Use and effectiveness, memory to memory vector architectures, vector register architecture, vector length and stride issues, and compiler effectiveness in vector processors. Case study with real life Intel processor.

Unit III:

Memory: hierarchy Cache Introduction, mapping technique; direct, set associative and fully associative. Techniques to reduce cache misses, techniques to reduce cache penalties, technique to reduce cache hit times. Effect of main memory bandwidth, effect of bus-width, memory access time, virtual memory, memory mapped management technique.

RISC architectures: addressing modes, instructions formats, effect of simplification on the performance, example processors such as MIPS, PA-RISC, SPARC, Power PC, etc.

Unit IV:

MIMD Multiprocessors: Centralized shared architectures, distributed shared memory architectures, synchronization and memory consistency models, message passing architectures, comelier issues. Data flow architectures, Interconnection networks.

D. List of practical:

1. Hands on experience with VHDL/Verilog tools, synthesize circuits targeted to standard gate library.
2. Write VHDL/Verilog codes for 4 bit. Design and implement a pipelined 4 bit CPU with few instructions and synthesize. CPU with few instructions synthesize and port it to FPGA.
3. Design and implement a pipelined 4 bit CPU with few instructions and synthesize.
4. Design and implement a parallel 4 bit CPU with few instructions and synthesize.
5. Study of cache performance in presence of multi-level cache hierarchy.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *Hwang, "Advanced Computer architecture with parallel programming", McGraw-Hill, 1993.*
2. *N. Carter, "Computer Architecture", Schaum Series,Tata McGraw-Hill.*
3. *D. A. Patterson and J. L. Hennessy, "Computer Architecture:AQuantitative Approach", 2nd ed. Morgan Kaufman, 1996.*
4. *Kai Hwang, FayéAlaye Briggs, "Computer Architecture & Parallel Processing", Tata McGraw-Hill.*
5. *Linda Null, Julia Lobur, "The Essentials of Computer Organization and Architecture", Jones & Bartlett Learning.*
6. *Andrew S. Tanenbaum, Todd Austin, "Structured Computer Organisation",Pearson, 2013.*
7. *Mohamed Rafiquzzaman, Rajan Chandra, "Modern Computer Architecture",Galgotia Publication Private Ltd.*
8. *Hesham El-Rewini, Mostafa Abd-El-Barr, "Advanced Computer Architecture and Parallel Processing", Wiley Series on Parallel and Distributed Computing.*

Magazines:

1. *IEEE Micro Magazine | IEEE Computer Society - IEEECS, United States*

Journals:

1. *ACM Transactions on Architecture and Code Optimization (TACO),ACM New York, USA*
2. *IEEE Transactions on Computers, IEEE Computer Society, United States*
3. *ACM Transactions on Embedded Computing Systems (TECS), ACM New York, USA*
4. *Future Generation of Computer Systems, Elsevies, Netherlands*
5. *International Journal of Parallel Programming, Springer, United States*
6. *Computer Architecture Letters, IEEE Computer Society, United States*

Name of the Module: Design & Analysis of Algorithm
Module Code: CSE 403
Semester: 4th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. learning specification of the concept of algorithm and analysis of its computational complexity,
2. learning design principles of algorithms and their application to computing problems,
3. makinganalysis accessible to all levels of readers.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. design algorithms for difficult problems,
2. analyseand understand their complexity,
3. implement the algorithms in practice.

C. Subject matter:

Unit I:

Models of computation: RAM, TM etc. time and space complexity

Asymptotic Notation: Big-O, omega, theta etc.; finding time complexity of well known algorithms like- heap sort, search algorithm etc.

Algorithm Design techniques: Recursion- Definition, Use, Limitations, and Examples: Hanoi problem. Tail Recursion

Divide and Conquer: Basic method, use, Examples: Merge sort, Quick Sort, Binary Search

Unit II:

Dynamic Programming: Basic method, use, Examples: matrix-chain multiplication, all pair shortest paths, single-source shortest path, travelling Salesman problem

Branch and Bound: Basic method, use, Examples: The 15-puzzle problem

Backtracking: Basic method, use, Examples: Eight queens problem, Graph coloring problem, and Hamiltonian problem

Unit III:

Greedy Method: Basic method, use, Examples: Knapsack problem, Job sequencing with deadlines, minimumspanningtree(Prim's and Kruskal's algorithms)

Lower Bound Theory: Bounds on sorting and sorting techniques using partial and total orders.

Disjoint SetManipulation: Set manipulation algorithm like UNION-FIND, union by rank, Path compression.

Properties of graphs and graph traversal algorithms: BFS and DFS

Unit IV:

Matrix manipulation algorithms: Different types of algorithms and solution of simultaneous equations, DFT & FFT algorithm; integer multiplication schemes

Notion of NP-completeness : Non deterministic algorithm, COOK's theorem, P class, NP-hard class, NP-complete class, CNF Satisfiability problem, proof a problem to be NP hard, Clique Decision Problem.

Approximation algorithms : Necessity of approximation scheme, performance guarantee, Polynomial time approximation schemes: 0/1 knapsack problem

D. List of practicals: (Minimum five experiments should be conducted by students)

Write the following problems in any programming language.Programming Language used: C

1. Divide and Conquer:
   - Implement Binary Search using Divide and Conquer approach
   - Implement Merge Sort using Divide and Conquer approach
   - Implement Quick Sort using Divide and Conquer approach
   - Find Maximum and Minimum element from a array of integer using Divide and Conquer approach
2. Dynamic Programming:
   - Find the minimum number of scalar multiplication needed for chain of matrix
   - Implement all pair of Shortest path for a graph (FloyedWarshall Algorithm)
   - Implement Traveling Salesman Problem
   - Implement Single Source shortest Path for a graph (Dijkstra , Bellman Ford)
3. Brunch and Bound:
   - Implement 15 Puzzle Problems
4. Backtracking:
   - Implement 8 Queen Problem
   - Graph Coloring Problem

- Hamiltonian Problem

5. Greedy method:
   - Knapsack Problem
   - Job sequencing with deadlines
   - Minimum Cost Spanning Tree by Prim's Algorithm
   - Minimum Cost Spanning Tree by Kruskal's Algorithm
6. Graph Traversal Algorithm:
   - Implement Breadth First Search (BFS)
   - Implement Depth First Search (DFS)

E. Teaching/ Learning/ Practice pattern:

Teaching: 60%
Learning: 40%
Practice: 0%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading Lists :

A. Books:

1. *Alfred V Aho, John E Hopcroft,"Design and Analysis of Computer Algorithms", Pearson Education India, 1974, ISBN 8131702057, 9788131702055.*
2. *Donald Ervin Knuth,"The Art of Computer Programming: Fundamental algorithms",Addison-Wesley Publishing Company, 1973, 2nd ed..*
3. *Ellis Horowitz, SartajSahni, SanguthevarRajasekaran,"Computer Algorithms ", Silicon Press, 2008, 2nd ed..*
4. *Seymour E. Goodman, S. T. Hedetniemi,"Introduction to Design and Analysis Of Algorithms",McGraw-Hill, 1977, 2, illustrated.*
5. *K. Mehlhorn,"Data Structures and Algorithms 1: Sorting and Searching", Springer Science & Business Media, 2013.*
6. *K. Mehlhorn , "Data Structures and Algorithms 2: Graph Algorithms and NP-Completeness", Springer Science & Business Media, 2012.*
7. *S.Baase "Computer algorithms : introduction to design and analysis", Pearson Education India, 2009.*
8. *E.Horowitz and S. Shani "Fundamentals of Computer algorithms", Galgotia Publications, 1984.*
9. *Edward Martin Reingold, J urgNievergelt, N. Deo,"Combinational algorithms: Theory and Practice", Pearson Education Canada, 1977.*
10. *Allan Borodin, Ian Munro, "The computational complexity of Algebraic and Numeric problems", American Elsevier Pub.Co., 1975.*
11. *Steven S Skiena,"The Algorithm Design Manual", Springer Science & Business Media, 2009, 2, illustrated, reprint.*

B. Magazines:

1. *Slaves to the algorithm - Aeon Magazine*
2. *Algorithm Articles - Offshore Magazine*

C. Journals:

1. *Journal of Algorithms, Elseviers, Netherland*
2. *Algorithms — Open Access Journal, MDPI, Basel, Switzerland*
3. *TIT - IEEE Transactions on Information Theory, IEEE Computer Society, United State*
4. *SIAMCOMP,- Siam Journal on Computing*

Name of the Module: System Software & Administration
Module Code: CSE 404
Semester: 4th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

The course is designed to meet with the objectives of learning:

1. working principle of Assemblers, Macro Processors, Loaders etc,
2. different loaders and loading schemes,
3. working principle and different configurations in unix based operating systems,
4. process programming in unix based operating system,
5. structure of file Systems in unix operating systems and Network File Systems, and
6. process of system backup and recovery.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. know assembler, linker, loader, macro and their working principles,
2. practice different general commands and pipelining used in unix commands,
3. learn different types of loaders using programming languages,
4. learn shell programming in unix based operating systems,
5. program linux assembly level programming,
6. configuration of different services in unix operating systems.

C. Subject matter:

Unit I:

Assemblers: General design procedures, instructions and data representations, Design of two pass assemblers, Linux assembly language, assembly language programming and simulation using X86, Cross Assemblers

Macro Processors: Features of a macro facility, macro instruction arguments, conditional macro expansion, macro calls within macros, Macro Assemblers.

Unit II:

Loader schemes: Compile and go loaders, absolute loaders, relocating loader, Linking, Reallocation-static & dynamic linking, Direct linking loaders.

Binders, Overlays, dynamic binders; working principle of Editors, Debuggers.

Unit III:

Overview of Unix system, commands and utilities; Basic Linux administration and installation: grub, rpm, yum, disk partitioning; Basic Linux utilities, logging, backup, authentication; Internet mail system: send mail, elm, mail administration; Program Maintenance: make, sccs, debugging with gdb and ddd (Data Display Debugger)

Archiving: shar, tar; Shell use: redirection, .cshrc, environment variables; Regular Expression parsing: grep, egrep, sed, awk; Shell programming: bash; Scripting Languages like Perl, Python, Java Script; Database Driven Web Site: PHP and MySQL;
Study of unix file systems and functionalities of different directories, directory layout.

Unit IV:

Different Editors and their operation techniques: vi, nano, vim, emacs

Documentation and Presentation: Document writing and Slides using LaTex; Windows administration: Managing the server operating system, file, and directory services, Software distribution and updates, Profiling and monitoring assigned servers, Security and Troubleshooting;

Services and Daemons: Configuring the Default Runlevel, Configuring the Services, Running Services, Additional Resources, list of services and their names, Case study of services: NFS, FTP, DNS etc

Case study on Bit bucket, GitHub

D. List of practical: (Minimum eight experiments should be conducted by students)

1. Study and installation of unix based operating system.
2. Study and practices of basic unix commands, shortcuts and pipelining, managing accounts, privileges given to different users, create groups, changes passwords etc
3. Introduction of Shell Programming with examples.
4. Study and practice of Linux assembly language programming using x86 assembly language programming.
5. Study and practice of NASM assembly language programming.
6. Implementation of Pass 1 and Pass 2 of a assembler.
7. Implementation of Macro processor
8. Implementation a Symbol Table With different functions.
9. Implementation of a Single Pass and two pass Macro Processor.
10. Study and configuration of NFS Configuration.
11. Sudy and practice of Process Identification, Creation and Kill using system call fork() & exec() function and Zombie processes.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 20%
Practice: 40%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *Andrew S. Tanenbaum, Todd Austin, "Structured Computer Organization", Pearson, 2013, 6th Edition, ISBN: 0132916525, 9780132916523*
2. *Robert L. Britton, "MIPS Assembly Language Programming", Pearson/Prentice Hall, 2004, ISBN: 0131420445, 9780131420441*
3. *L.L. Beck, "System Software", (3rd Ed.), Pearson Education India, 1997, ISBN: 817758555X, 9788177585551*
4. *L. Lamport, "LaTeX: A Document Preparation System", 2nd Ed., Addison-Wesley Series, 1994.*

5. *Donovan, "Systems Programming", Tata McGraw-Hill Education, 2001, ISBN: 0074604821.*
6. *Dandamudi, Sivarama P., "Guide to Assembly Language Programming in Linux", Springer US, 2005, eBook ISBN: 978-0-387-26171-3*
7. *The Web Technologies Series", Cengage Learning, 2010, ISBN: 0538745843, 9780538745840*
8. *B. Kauler, "Windows assembly language & Systems Programming: 16- and 32-Bit Low-Level Programming for the PC and Windows", 2nd Ed., CMP Books; August 1997*
9. *S. Kochan and P. Wood, "Unix Shell programming", 3rd Ed., SAMS, 2003.*
10. *S. Das, "Unix System V.4 Concepts and Applications", 3rd Ed., Tata Mcgraw-Hill, 2003.*
11. *Nithyashri, "System Software", Tata McGraw-Hill Education, 2010, ISBN: 0070671923, 9780070671928.*
12. *A.A.PuntambekarI.A.Dhotre, "System Software", Technical Publications, 2007, ISBN: 8184310307, 9788184310306*
13. *ShantanuChattopadhyay, "System Software", PHI Learning Pvt. Ltd., 2007, ISBN: 812033051X, 9788120330511.*
14. *Kirch, "Linux network Administrator's guide (2nd Ed.)", O'Rielly*
15. *Steve Maxwell, "UNIX System Administration: A Beginner's Guide", McGraw Hill Professional, 2002.*
16. *Limoncelli, "The Practice of System & Network Administration", Pearson*

Magazines:

1. *IBM Systems Magazine, IBM, NewYork,* U.S
2. *Linux Magazine*
3. *Open Source Magazine*
4. *ADMIN Magazine*

Journals:

1. *Journal of Software Engineering and Applications, Inderscience, Switzerland, ISSN online: 2053-2474, ISSN print: 2053-2466.*
2. *Journal of Systems and Software, Elsevier, Netherland, ISSN: 0164-1212.*
3. *Software and System Modeling (SoSyM), Springer, ISSN: 1619-1366 (Print) 1619-1374 (Online).*
4. *Innovations in Systems and Software Engineering, Springer, ISSN: 1614-5046 (print version), ISSN: 1614-5054 (electronic version).*

Name of the Module: Control System Engineering
Module Code: EE 405
Semester:4th
Credit Value: 3[P = 2, T = 0, L = 3]
Module Leader:
Module Tutor(s):

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical and practical knowledge to the students in the area of process control engineering.

2. study of basic characteristics of feedback control systems.
3. introduction to FRA and State Variable Analysis.
4. study of basic concepts of optimal control and non-linear control.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand the basic terminology used in control system engineering.
2. use and apply skills in designing and operation f control systems employed in various industries.

C. Subject matter:

Unit I:

Introduction: Concept of feedback and Automatic Control, Electrical analogy of physical system. Transfer Function, Design and Compensation of control systems, Block diagram representation of Control Systems, Block Diagram Algebra, Signal Flow Graph, and Mason's gain formula, Modelling in state space.

Unit II:

Control system components: Error sensing devices, potentiometer, Synchros, D.C. and A.C. tacho meters, servo motors, modulators and demodulators.

Mathematical modelling of physical systems: State space representation of differential equations, Liquid level systems, Pneumatic systems, Hydraulic systems, Thermal systems, Transformation of mathematical models in MATLAB.

Unit III:

Steady State and Transient Analysis: Introduction to first order, second order and higher order control systems, Transient analysis of closed loop systems, Transient errors and their minimisation, steady state error and their minimisation, error coefficients, P, PI and P-I-D type controllers, Effects of integral and derivative control on system performance, Tuning methods: Ziegler-Nichol's Tuning, Zero placement approach, degrees of freedom.

Unit IV:

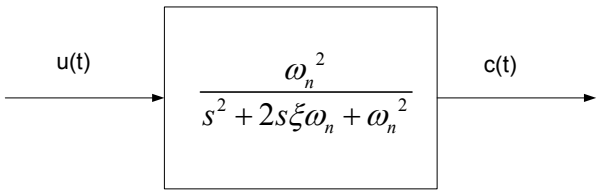
StabilityofControlSystems:R-Hcriteria,Nyquistcriteria,BodePlots.PolarPlots,Nicholschart, measures of relativestability. Construction of Root Loci for simple system, effects of the movement of poles and zeros, Lead compensation, Lag compensation, Lead-Lag compensation, Improvement of system per formance through compensation. Case studies on control voltage, current, frequency, position and speed. Control of liquid level, density, flow, temperature etc, Relative stability analysis, State space analysis, controllability, observability.

D. List of practicals:

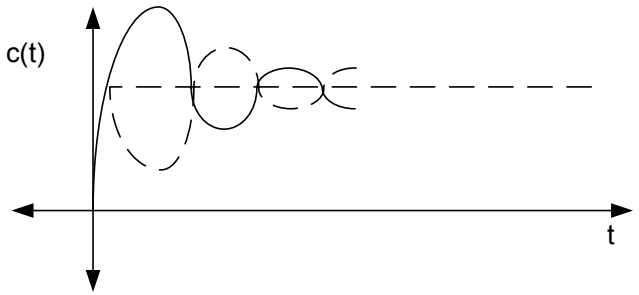
1. Familiarization with MATLAB control system toolbox, MATLAB Simulink toolbox & PSPICE.
2. Determination of step response for first order& second order system with unity feedback on CRO & calculations of control system specification.
3. Calculation and verification of time constant, peak over shoot, setting time etc. from the response.
4. Simulation of step response&impulseresponsefortype-0,type-1& type-2 system with unity feedback using MATLAB &PSPICE.
5. Determination of Root Locus, Bode-Plot, Nyquist Plot using MATLAB-Control system

toolbox for 2nd order system determination of different control system specifications from the plot.

6. Determination of PI, PD, PID controller action of first order simulated process.
7. Determination of approximate transfer function experimentally from Bode plot.
8. Evaluation of steady state error, setting time, percentage peak over shoot , gain margin, phase margin,with addition of lead compensator & by compensator in forward path transfer function for unity feedback control system using PSPICE.
9. Determination of control system specifications for variations of system parameters in practical position control system.
10. a. Design of a second order linear time invariant control system and study of system response with unit step input.



b. Designa scheme for minimization of possible oscillation with generation of the dotted signal as shown below.



c. Generalization of the technique for oscillation free response based on above idea (b).

E. Teaching/Learning Practice Pattern:

Teaching: 50%
Learning: 40%
Practice: 10%

F. Examination Pattern:

1. Theoretical Examination: On line.
2. Practical Examination: Performing experiments and viva voce.

G. Reading Lists:

Books:

1. *Kuo B. C. "Automatic Control System", Prentice Hall of India.*
2. *Das Gupta , "Control System Theory", Khanna Pub.*
3. *Nagrath I J & Gopal M, "Control Systems Engineering", New Age International Pub.*
4. *Ogata K, "Modern Control Engg", Prentice Hall of India.*

5. *Dorf R C & Bishop R.H, "Modern Control System,", Addison,Wiley.*
6. *Bolto, "Industrial Control & Instrumentation", Orient Longman.*
7. *Nakra, "Theory & Applications of Automatic Control", New Age International.*
8. *Gopal, "Modern Control System Theory", New Age International.*
9. *Gopal, "Digital Control Engineering", New Age International.*
10. *Sinha, "Control Systems", New Age International.*

Magazines:

1. *Industrial Electronics Magazine, IEEE.*
2. *Control and Automation Magazine, IEEE.*
3. *Process control and engineering, Elsevier.*
4. *Control and Automation Magazine, IET.*

Journals:

1. *Intelligent Systems, IEEE Transactions.*
2. *Journal of Control Theory and Applications, Springer Publications.*

Name of the Module: Entrepreneurship and Innovation:
Module Code: HSS 401
Semester: 4th
Credit Value: 3 [P=0, T=0, L=3]

A. Objectives:

The course is designed to meet the objectives of:

1. to involve themselves in the business activities
2. starting innovative practices in their entrepreneurial activities.
3. developing their skills on the traits that they want to carry forward.
4. starting activities on Forest based Technology.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. start their venture more scientifically.
2. start their venture by linking with the financial institutions.

C. Subject matter:

Unit I:

Introduction to Entrepreneurship: Meaning, Role of Entrepreneur, Entrepreneur Process: different approaches, Motivation for becoming an Entrepreneur.

SME Concept, its role, status, prospects and policies for promotion of SMEs.

Importance of Entrepreneurship: innovations, Qualities of successful Entrepreneur, Functions of an Entrepreneur, Types of Entrepreneur, Issues & Problems Entrepreneurial Practices,

Unit II:

Importance of Entrepreneurship: innovations: Converting Innovation to Economic Value which includes, Growth Strategies, value position, Market Segments, Value Chain Structure, Revenue Model

etc., Qualities of successful Entrepreneur, Functions of an Entrepreneur, Types of Entrepreneur, Issues & Problems Entrepreneurial Practices.

Contribution of Entrepreneurs: Towards R&D, creates Wealth of Nation & Self prospect with Challenge.

Entrepreneur Carrier: Different Stages, Entrepreneur Development Programmers (EDPs).

Unit III:

Characteristics of Entrepreneurship: Risk taker, Perceptive, Curious, Imaginative, Persistent, Goal setting, and Hardworking, Research & Management Skill, Organising & Controlling, Soft skills and Feasibility.

Women Entrepreneurship: Opportunities, promotion Hurdles and Prospects of women Entrepreneurs.

Factors & Models of Entrepreneurial Development.

Social Entrepreneurial Initiative: Solving social Problems, Business plan, Strategic Plan vs Business Plan

Unit IV

Forest based Industries: Mobilization of resources from NTFP products, Processing units, Technical and Financial Feasibility study and analysis of projects under self employment scheme including small entrepreneur.

Farm based enterprises for production and post production of Agri-produce:

Crops: Cereals, Legumes, Oilseeds; Horticulture crops : Fruits and vegetables; Livestock production : Poultry, Fishery, Medicinal and Aromatic plants.

Handlooms & Sericulture; Handicraft, coir, jute & leather

Micro entrepreneurial skills development and good production practices

D. Teaching/ Learning/ Practice pattern:

Teaching: 70%
Learning: 30%
Practice: 0%

E. Examination pattern:

1. Theoretical Examination

F. Reading Lists:

Books:

1. *Desai, Vasant, Small-Scale Industries and Entrepreneurship. Himalaya Publishing House, Delhi.*
2. *Kaulgud, Aruna (2003). Entrepreneurship Management. Vikas Publishing House, Delhi.*
3. *3.Cynthia, L. Greene (2004). Entrepreneurship Ideas in Action. Thomson Asia Pvt. Ltd., Singapore.*
4. *Timmons, Jerry A., and Spinelli, Stephen, 2009. New Venture Creation: Entrepreneurship for the 21st Century, 8th Edition, Boston, MA: Irwin McGraw-Hill*
5. *Entrepreneurship: Successfully Launching New Ventures by Barringer, Pearson Education Publishing*
6. *Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001*
7. *Donald F. Kuratko, Entrepreneurship: Theory, Process, Practice Cengage Learning*

Magazines:

1. *Longe Magazine*
2. *Home Business Magazine*
3. *Entrepreneur*

Journals:

1. *International Journal of Entrepreneurship*
2. *International Journal of Innovation Management*
3. *Journal of Small business and Entrepreneurship*
4. *Journal of Human Values.*
5. *Journal of Management Research*

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Department of Computer Science & Engineering

Fifth Semester

Subject Code	Subject	P	T	L	Credit
ECE – 501	Microprocessors, Microcontrollers & Embedded	2	0	3	4
ECE-521	Principle of Communication Engineering	2	0	3	4
CSE – 501	Operating System	2	0	3	4
CSE – 503(I)	Database Management system	2	0	3	4
HSS – 501	Industrial Management	0	0	3	3
CSE - 505	Graph Theory & Combinatorics.	0	0	3	3
MAS - 521	Computational Numerical Methods	2	0	3	4
		10	0	21	26

Name of the Module: Microprocessor, Microcontroller & Embedded System
Module Code: ECE 501
Semester: 5th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To study the Architecture of microprocessor and microcontroller
2. To study the Interrupts and DMA
3. To study the synchronous, asynchronous, interrupt driven using 8255

B. Learning outcomes:

Upon completion of the subjects, the student would be able to:

1. Design a microprocessor
2. Configure or design a microprocessor-based system.
3. Understand efficiency in microprocessor-based system.
4. Write code or a compiler for a microprocessor which takes advantage of the advanced architectural techniques.

C. Subject matter:

Unit I:

Architecture of microprocessor; case study with intel series of microprocessors. Assembly language programming using intel 8085 microprocessor.

Unit II:

Interfacing of memory to a microprocessor; system bus, timing diagram, peripheral chips (IO mapped IO & Memory mapped IO). Interrupts and DMA. Interfacing of I/O devices; modes of data transfer, synchronous, asynchronous, interrupt driven using 8255 PPI, interfacing of DAC and ADC. Serial mode of data transfer using 8251.

Unit III:

Interfacing of key board and display devices using 8279, Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same. Typical applications of a microprocessor.

Unit IV:

Microprocessor versus Microcontroller architecture. Memory and I/O interfacing to 8051 microcontroller. 16 bit processors: 8086 and architecture, segmented memory hascycles, read / write cycle in min / max mode. Reset operation, wait state, Halt state, Hold state, Lock operation, interrupt processing. Addressing modes and their features.

D. List of Practical:

1. Start two set of integer into two arrays. Add even number into two arrays. Add even number of one array with odd number of another & vice –versa.
2. To develop a subroutine to add two floating point quantities.
3. To develop program to multiply two single byte unsigned numbers, giving a 16 bit product.
4. To develop subroutine which will multiply two positive floating point numbers.
5. Design a delay loop using i) NOP instruction and ii) Loop Instructions. ADD X, Y for a fixed period. Compare the two.
6. To write program to evaluate P* Q*+R*S are 8 bit binary numbers.
7. To write a program to divide a 4 byte number by another 4 byte number.
8. Write a program for adding first N natural numbers and store the results in memory location X.
9. Write a program which decrements a hex number stored in register C.
10. To design and interface a circuit to read data from an A/D converter, using the 8255 A
11. To design and interface a circuit to convert digital data into analog signal using the 8255 A in the memory mapped I/O.
12. To interface a keyboard with the microprocessor using 8279 chip and transfer the output to the printer.
13. To design a circuit to interface a memory chip with microprocessor with given memory map.

E. Teaching/Learning/Practice pattern:

Teaching : 40%
Learning : 10%
Practice : 50%

F. Examination pattern:

1. Theoretical Examination: Open book/ Regular examination and on line test.
2. Practical Examination: Conducting Experiment and Viva-Voce.

G. Reading Lists:

Books:

1. *Microprocessor architecture, programming and applications with 8085/8085A, Wiley eastern Ltd, 1989 by Ramesh S. Gaonkar.*
2. *Intel Corp: The8085/8085A. Microprocessor Book–Intel marketing communication, Wiley interscience publications, 1980.*
3. *The 8051 Microcontroller And Embedded Systems Using Assembly And C, 2/E by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, Pearson India*
4. *An introduction to microcomputers Vol.2– some real Microprocessor – Galgotia Book Source, New Delhi by Adam Osborneand J. Kane*
5. *Advanced Microprocessors by Rayand Bhurchandi-TMH*
6. *Intel Corp. Micro Controller Handbook–Intel Publications,1994.*
7. *Microprocessors and Interfacing by Douglas V. Hall, McGraw Hill International Ed. 1992*
8. *Assembly Language Programming the IBMPC by Alan R. Miller, Subex Inc, 1987*

9. *The Intel Microprocessors: 8086/8088,80186,80286,80386&80486, Bary B.Brey, Prentice Hall, India*

Magazines:
1. *IEEE Spectrum*
2. *Electronics for you*
3. *Electropages*
4. *The Future of Microprocessors*

Journals:
1. *Microprocessors and Microsystems- Embedded hardware design (Elsevier)*
2. *International Journal of Embedded Systems*

Name of the Module: Principle of Communication Engineering
Module Code: ECE-521
Semester: 5th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To make the students to understand different types of modulation and demodulation techniques.
2. Communication signals to be encountered in communication engineering and to study their behaviour in time and frequency domain.
3. To make students familiarization about radio signals transport by multiplexing and de multiplexing.
4. To make students to know about noise problem in communication, and to solve the problem.

B. Learning outcomes:

At the end of this module, students are expected to be able to

1. Utilize the appropriate modulation techniques & multiplexing in transporting signals over a channel.
2. To reject noise from the communication signals.

C. Subject matter:

UNIT I:

Review: Classification of signals, Basic blocks of communication system, Introduction to various terminologies: Transmitter, Receiver, Modulation, Carrier, Channel etc, Review of Frequency Bands, Fourier Transform and Fourier series.

Amplitude Modulation Systems: Need for modulation, normal AM, generation and demodulation (envelope & synchronous detection), modulation index, DSB-SC: generation and demodulation, Effect of phase and frequency offset on demodulation, SSB: Generation using filter and phasing method, detection. Frequency division multiplexed systems using SSB.

UNIT II:

Angle Modulation Systems: Concept of frequency and phase modulation, frequency deviation and modulation index, FM spectra, Carson's rule, narrowband FM, generation of Wideband FM Armstrong method, direct FM generation. Demodulation of FM-discriminatory, Effect of non-

linear distortion and interferences, Superheterodyne analog AM/FM receivers, FM Broadcasting system, Pre-emphasis and de- emphasis, PLL.

Radio Receivers: TRF and superheterodyne receiver, AGC, FM receiver, sensitivity, selectivity, image frequency rejection measurements, communication receiver and its special features.

UNIT III:

Sampling and Discrete time Modulations: Sampling Theorem – low pass and band pass, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM) their generation and detection-phase time division multiplying. Review of random signals and noise, signal to noise ratio in amplitude and angle modulated systems. Thermal and shot noise, White noise and filtered noise, AWGN Properties, Noise equivalent bandwidth concept.

Random signal theory: Discrete probability theory, Continuous random variables, Statstically independent random variables, Probability density functions of sums, Transformation of density functions, Ergodic functions, Correlation process, Spectral density.

UNIT IV:

Digital Communication: PCM, quantization noise, bandwidth, advantages over analog communication, PCM system, Differential PCM, Delta Modulation, Digital Modulation – ASK, FSK, PSK, DPSK, Digital Multiplexing. Power Line Carrier: Interfacing with power line, description of a typical system.

D. List of Practicals: (Minimum eight experiments should be conducted by students)

1. Design an AM transmitter (or Use AM Trainer kit) to study Amplitude Modulation with given input wave and carrier wave, and hence the power efficiency of AM.
2. Use the AM transmitter designed in experiment number 1 to generate SSB and DSB transmitter with necessary other circuits. Study the output and power efficiency of the circuit.
3. Design a FM transmitter (or Use FM Trainer kit) to study Frequency Modulation with given input wave and carrier wave, and hence the power efficiency of FM.
4. Use the FM transmitter designed in experiment number 3 to generate PM with necessary other circuits. Study the output and power efficiency of the circuit of PM transmitter.
5. Design an SSB-SC receiver and use it with the circuit of experiment number 2 (SSB-SC transmitter) to design a complete SSB-SC radio.
6. Design PLL demodulator of PM and test the same with PM transmitter designed in experiment number 4.
7. Design any practical noise filtering circuit, and study its input and output in term of signal to noise ratio.
8. Design mixer circuit for any given FR amplifier, and study its performance.
9. Design a 4 to 1 FDM and study its operation.
10. Design a 1 to 4 demultiplexer and use it with the circuit of experiment number 9 and justify the communication by multiplexing.

E. Teaching/Learning/Practice pattern:

Teaching : 40%
Learning : 10%
Practice : 50%

F. Examination pattern:

1. Theoretical Examination: Open book/ Regular examination and on line test.
2. Practical Examination: Conducting Experiment and Viva-Voce.

G. Reading Lists:

Books:

1. *H Taub and D. L. Schilling, "Principles of Communication System",(2nd Edition), McGraw Hill, New Delhi.*
2. *Carlson, "Communication System",(4th Edition) Tata McGraw Hill, New Delhi,*
3. *B P Lathi and Zhi Ding, " Modern Digital and Analog Communication Systems", Oxford University Press, India*
4. *L. W. Couch Li, "Digital and Analog Communication System",(6th Edition), Pearson Education, Pvt. Ltd*
5. *J A Betts, "Signal Processing, Modulation and Noise",(Unibooks), Hodder & Stoughton Ltd (January 1, 1974)*
6. *Siman Haykin, "Communication Systems",(4th Edition), John Wiley and Sons Inc.*
7. *Kennedy and Davis, "Electronic Communication Systems"(4th Edition), Tata McGraw Hill.*
8. *John G. Proakis and M Salehi , "Fundamental of Communication Systems", Pearson Education*

Magazines:

1. *Electronics For You*
2. *Electronics Business Magazine.*
3. *Chip*

Journals:

1. *Journal of Electronic Measurement and Instrument*
2. *Springer*
3. *IEEE Spectrum*
4. *Bell Systems Technical Journal*
5. *Electronics Letter*

Name of the Module: Operating System
Module Code: CSE 501
Semester: 5th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. appreciating the role of an operating system,
2. making aware of the issues in management of resources like processor, memory and input-output,
3. selecting appropriate productivity enhancing tools or utilities for specific needs like filters or version control,
4. obtaining some insight into the design of an operating system.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understands what is an operating system and the role it plays,
2. gethigh level understanding of the structure of operating systems, applications, and the relationship between them,

3. gatherknowledge of the services provided by operating systems,
4. getexposure to some details of major OS concepts.

C. Subject matter:

Unit I:

Introduction: Introduction to Operating System: Operating system functions, evaluation of Operating System, Different types of Operating System: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), Operating System services, system calls.

Process Management: Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, inter- process communication. Threads: overview, benefits of threads, user and kernel threads.

Unit II:

CPU Scheduling: Scheduling criteria: pre-emptive & non-pre-emptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization: background, critical section problem, critical region, synchronization hardware,classical problems of synchronization, semaphores.

Unit III:

Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management: Memory Management: background, logical vs. physical addresses space, TLB,swapping, contiguous memory allocation, paging, segmentation, segmentation with paging. Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems: 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.

Unit IV:

I/O Management: 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: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN), disk reliability, disk formatting, boot block, bad blocks.

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

Case Studies; Dos &Unix.

D. List of practicals:

Familiarization with UNIX system calls for process management and inter-process communication;

Experiments on process scheduling and other operating system tasks through simulation under a simulated environment (like Nachos, pintos).

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%

Learning: 10%

Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books:

1. *Abraham Silberschatz, Peter B. Galvin, Greg Gagne,"Operating System Concepts", Wiley, 2014, 9th ed., illustrated, revised.*
2. *Andrew S Tanenbaum, Albert S Woodhull, "Operating System Design & Implementation", Pearson Education, 2011, 3rd ed..*
3. *D. M. Dhamdhere,"Operating Systems: A Concept-based Approach", Tata McGraw-Hill Education, 2006, 2nd ed..*
4. *William Stallings, "Operating Systems", Pearson Education India, 2006, 5th ed. .*
5. *Harvey M. Deitel, "An Introduction to Operating Systems", Addison-Wesley, 1990, 2, illustrated ed..*
6. *Maurice J. Bach,"Design of the Unix Operating System", Prentice-Hall, 1986 ,15, illustrateded..*
7. *Milenkovie M., "Operating System: Concept & Design", Tata McGraw-Hill Education, 2001, 2nd ed..*

Magazines:

1. *SIGOPS - Operating Systems Review, ACM New York, USA*

Journals:

1. *TOCS - ACM Transactions on Computer Systems, ACM, United State*
2. *TPDS - IEEE Transactions on Parallel and Distributed Systems, IEEE Computer Society, United State*

Name of the Module: Database Management System
Module Code: CSE 503 (I)
Semester: 5th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of understanding

1. the purpose of a database management system (DBMS),
2. the role of the database administrator,
3. what is meant by data consistency, data integrity, data redundancy and data independence,
4. the concept of entity relationships and data normalisation,
5. the concept of a client/server database, and
6. the relevant advantages of a client/server database over a non-client/server database,

B. Learning outcomes:

Students successfully completing this module will be able to

1. design database, different operations, queries performed for a management system problems,
2. understand and design of ER-diagram in DBMS,
3. Implementation of different normalizations for database size reduction and removal of redundancy, and
4. able to implement PL/SQL, SQL injection, procedures etc.

C. Subject matter:

Unit I:

Introduction: Concept& Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

Entity-Relationship Model : Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

Unit II:

Relational Model: Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications of the Database.

SQL and IntegrityConstraints: Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries, Database security application development using SQL, Stored procedures and triggers.

Unit III:

Relational Database Design : Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Code Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

Internals ofRDBMS: Physical data structures, Query optimization : join algorithm, statistics and cost bas optimization. Transaction processing, Concurrency control and RecoveryManagement: transaction model properties, stateserializability, lock base protocols, two phase locking.

Unit IV:

File Organization & Index Structures : 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 .

D. List of practicals: (Minimum three experiments should be conducted by students)

Write the following in Oracle PL / SQL Stored Procedure

1. Design and perform different operations on a database for a management problem.
2. Study and implementation of different group functions (eg. avg, count, max etc.).
3. Study and implementation of different types of joins (eg. left, right, inner join etc.).
4. Study and implementation of views, indices.
5. Study and implementation of different types of integrity constraints.
6. Study and implementation of normalizations.
7. Perform and study of cursors and triggers.
8. Study and implement various PL/SQL procedures.
9. Study, use and implementation of different front end development tools in applications.
10. Perform and study of ODBC and CORBA calls from application programs.
11. Study and perform import and export in database.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%

Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Open Book and online Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading Lists:

Books:

1. *Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.GrawHil, 6th edition, ISBN: 0071289593, 9780071289597.*
2. *ElmasriRamez and NovatheShamkant, "Fundamentals of Database Systems", Benjamin Cummings Publishing. Company, ISBN 8131716252, 9788131716250.*
3. *Raghu Ramakrishnan, Johannes Gehrke, "Database Management System", McGraw-Hill, ISBN 0072465638, 9780072465631.*
4. *V.K. Jain, "Advanced Database Management System" ,Cyber Tech Publications, ISBN 8178840219, 9788178840215.*
5. *Date C. J., "An Introduction to Database Systems", Pearson Education India, 2006, ISBN 8177585568, 9788177585568.*
6. *Ullman JD., "Principles of Database Systems", Galgottia Publication, ISBN 8175155450, 9788175155459.*
7. *James Martin, "Principles of Database Management", Pearson Education,ISBN 0137089171, 9780137089178.*
8. *Arun K .Majumdar, Pritimay Bhattacharya, "Database Management Systems", Tata McGraw Hill, ISBN-13: 978-0074622391.*

Magazines:

1. *IBM Systems Magazine, IBM, New York, U.S.*
2. *IT - Data Management Magazines, IBM, New York, U.S.*
3. *Relational Database Management Systems (RDBMS and DBMS), IBM, New York, U.S.*

Journals:

1. *Journals in Database Management & Info Retrieval - Springer, United States*
2. *International Journal of Database Management Systems (IJDMS), Academy & Industry Research Collaboration Center (AIRCC)*
3. *Journal of Database Management (JDM), IGI, Hershey-New York, USA*

Name of the Module: Industrial Management
Module Code: HSS 501
Semester: 5th
Credit Value: 3 [P=0, T=0, L=3]

A. Objectives:

The course is designed to meet the objectives of:

1. Imparting theoretical lectures with case discussion.
2. Providing teaching with inclusive learning.

3. Making students aware about the importance of this subject in their future career.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. Students will be work with efficiency as they had knowledge of the subject.
2. With the backup knowledge their performance will definitely much better in their workplace.

C Subject matter:

Unit I:

Concept of Management: Various Approaches to Management, Management as – an art, a Science, and a Profession, Managerial skills, Process of management, Planning-Mission, Goals, Strategy, Program and Procedure; Decision making-process, decision making under risk and uncertainty, Models of decision making.

Unit II:

Principles of Organization: Organizational Structure, span of control, Staffing function with emphasis on, Performance Appraisal, Training and Development.

Unit III:

Direction and coordination: Motivation and Leadership, control function-Process and Techniques.

Unit IV:

Production Management: Types of Production, Locational Decisions, Plant layout and design, Production

Planning scheduling and control: work study, method Study, and Wage Payment Schemes and Bonus, Productivity – concept and measurement.

Material Management: Inventory Planning, Procurement-functions, procedures and control, storing-planning procedure and control, issue and pricing, Inventory control Techniques, Value analysis and Engineering.

D. Teaching/ Learning pattern:

1. Teaching : 50%
2. Learning/ case presentation : 30%
3. Assignment : 10%
4. Attendance : 10%

E. Examination pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading lists:

Books:

1. *Badiru ,A (ed),2005, Hand Book of Industrial and System Engineers, CRC press.*
2. Blanchand, B& Fabrycky, W.2005. System Engineering Analysis (4th Ed.). Prentice Hall.
3. Salvendy,G.(Ed.)2001.Hand Book Of Industrial Engineering: Technology &Operations Management, Wiley-Inter service.
4. Turner, W.et.al.1992 Introduction to Industrial and System Engineering(3rd ed.) Prentice Hall.

Magazines:

1. *Industrial Management and Entrepreneurship*
2. *Industrial Management Magazine*

Journals:

1. *Group and Organization Management*
2. *Journal of Organizational Behaviour*
3. *Journal of Management.*

Name of the Module: Graph Theory & Combinatorics
Module Code: CSE 505
Semester: 5th
Credit Value: 3 [P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical and practical application to the students in the area of Graphs and combinatorics,
2. injecting future scope and the research directions in the field of Graphs and Combinatorics,
3. making students competent to analyse and design of real world problem.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. adequately trained to model problems of real world.
2. skilled both theoretical and practical application to other branch of engineering.
3. substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Graph Theory

Graph Theory: Basic concepts, Graph isomorphism, Subgraph, Degree, Walk, Path, Cycle, Trees, Spanning trees, Cut vertices and cut edges, Connectivity, Euler tours and Hamiltonian cycles. Matching, Perfect matching, Colour of a graph, Vertex colouring, Chromatic polynomial, edge colouring. Planer and non-planer graphs, Euler's formula, Kuratowski's theorem. Test and planarity, Four colour theorem, Directed graphs, Tournaments, Network, Max Flow, Min cut theorem, Graphs and vector space. Graph enumeration. Polya's counting theorem, Graph algorithms, shortest path, Minimal spanning tree, Fundamental circuit, Isomorphism;

Unit II:

Combinatorics

Combinatorics: Basic combinatorial numbers. Recurrence, generating functions. Multinomials, Counting principles. Polya's theorem. Inclusion and exclusion principle. Block design and error correcting codes. Hadamard matrix, Finite geometries.

D. Teaching/Learning/Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

(Teacher is to divide components for T/R/P)

F. Examination pattern:

1. Theoretical Examination : Open book and on line.
2. Practical Examination : Conducting Experiments and Viva-Voce.

G. Reading lists:

Books:

1. *Berge, Claude. Hypergraphs: Combinatorics of Finite Sets Amsterdam: North-Holland, 1989.*
2. *Berge, Claude. Graphs, New York, NY: Elsevier Science, 1985. Second Revised Edition.*
3. *Biggs, Norman L. Algebraic Graph Theory New York, NY: Cambridge University Press, 1974.*
4. *Bollobas, Bela. Graph Theory: An Introductory Course New York, NY: Springer-Verlag, 1979.*
5. *Chartrand, Gary and Lesniak, Linda. Graphs Digraphs, Belmont, CA: Wadsworth, 1986. Second Edition.*
6. *Gibbons, Alan. Algorithmic Graph Theory New York, NY: Cambridge University Press, 1985.*
7. *Harary, Frank. Graph Theory Reading, MA: Addison-Wesley, 1969.*
8. *Anderson, Ian. A First Course in Combinatorial Mathematics New York, NY: Oxford University Press, 1974.*
9. *Berge, Claude. Principles of Combinatorics New York, NY: Academic Press, 1971.*
10. *Tucker, Alan. Applied Combinatorics New York, NY: John Wiley, 1980, 1984.*
11. *Anderson, Ian. Combinatorial Designs: Construction Methods New York, NY: Ellis Horwood, 1990.*
12. *Erdos, P. and Spencer, Joel H. Probability Methods in Combinatorics New York, NY: Academic Press, 1974.*
13. *Stanley, Richard P. Enumerative Combinatorics, Belmont, CA: Wadsworth, 1986.*
14. *Wallis, W.D. Combinatorial Designs New York, NY: Marcel Dekker, 1988.*
15. *Blake, Ian F. and Mullin, Ronald C. An Introduction to Algebraic and Combinatorial Coding Theory New York, NY: Academic Press, 1976.*
16. *Cameron, P.J. and van Lint, J.H. Graphs, Codes and Designs New York, NY: Cambridge University Press, 1980.*
17. *Hill, Raymond. A First Course in Coding Theory New York, NY: Clarendon Press, 1986.*
18. *Konheim, Alan G. Cryptography: A Primer New York, NY: John Wiley, 1981.*
19. *Sloane, N.J.A. A Short Course on Error Correcting Codes New York, NY: Springer-Verlag, 1975.*
20. *Welsh, Dominic. Codes and Cryptography New York, NY: Clarendon Press, 1988.*

Journals:

1. *Combinatorica*
2. *Discrete Applied Mathematics*
3. *Discrete Mathematics*
4. *European Journal of Combinatorics*
5. *Graphs and Combinatorics*
6. *Journal of Combinatorial Theory, Series A*
7. *Journal of Combinatorial Theory, Series B*
8. *Journal of Graph Theory*
9. *SIAM Journal on Computing*
10. *SIAM Journal on Discrete Mathematics*
11. *Theoretical Computer* Science

Magazines:

1. *Current Science (Indian Academy of Science)*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society)*

3. *Mathematical Spectrum(The University of Sheffield)*
4. *Mathematics Magazine (Mathematical Association of America)*
5. *+Plus magazine (University of Cambridge)*
6. *Ganithavahini (Ramanujan Mathematical Society)*

Name of the Module: Computational Numerical Methods
Module Code: MAS 521
Semester: 5th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. Introducing the basic concepts of round off error, truncation error, numerical stability and condition, Taylor polynomial approximations; to derive and apply some fundamental algorithms for solving scientific and engineering problems: roots of nonlinear equations, systems of linear equations, polynomial and spline interpolation, numerical differentiation and integration, numerical solution of ordinary differential equations.
2. Application of computer oriented numerical methods which has become an integral part of the life of all the modern engineers and scientists. The advent of powerful small computers and workstation tremendously increased the speed, power and flexibility of numerical computing.
3. Injecting future scope and the research directions in the field of numerical methods.

B. Learning outcomes:

Upon Completion of the subject:

1. Students will be skilled to do Numerical Analysis, which is the study of algorithms for solving problems of continuous mathematics.
2. Students will know numerical methods, algorithms and their implementation in 'C' for solving scientific problems.
3. Students will be substantially prepared to take up prospective research assignments.

C. Subject matter:

Unit I:

Errors in computation: Overflow and underflow; Approximation in numerical computation; Truncation and round off errors; Propagation and control of round off errors; Chopping and rounding off errors; Pitfalls (hazards) in numerical computations (ill conditioned and well conditioned problems).

Unit II:

Interpolation: Lagrange's Interpolation, Newton's forward & backward Interpolation Formula. Extrapolation; Newton's Divided Difference Formula; Error; Problems.

Unit III:

Numerical Differentiation: Use of Newton's forward and backward interpolation formula only.

Numerical Integration: Trapezoidal formula (composite); Simson's 1/3rd formula (composite); Romberg Integration (statement only); Problems.

Unit IV:

Numerical Solution of System of Linear Equations: Gauss elimination method; Matrix Inversion; Operations Count; LU Factorization Method (Crout's Method); Gauss-Jordan Method; Gauss-Seidel Method; Sufficient Condition of Convergence.

Numerical Solution of Algebraic and Transcendental Equations: Iteration Method: Bisection Method; Secant Method; Regula-Falsi Method; Newton-Raphson Method.

Numerical solution of Initial Value Problems of First Order Ordinary Differential Equations: Taylor's Series Method; Euler's Method; Runge-Kutta Method (4th order); Modified Euler's Method and Adams-Moulton Method.

D. List of practicals: (Minimum six experiments are required to be performed by students)

1. Assignments on Interpolation: Newton forward & backward, Lagrange.
2. Assignments on Numerical Integration: Trapezoidal Rule, Simson's 1/3rd Rule.
3. Assignments on Numerical solution of a system of Linear Equations: Gauss elimination, Gauss Jordan, Matrix Inversion, Gauss Seidel.
4. Assignments on Solution of Algebraic Equations: Bisection, Secant, Regula-Falsi, Newton-Raphson Methods.
5. Assignments on Ordinary Differential Equations: Taylor Series, Euler's Method, Runge-Kutta (4^{th} Order).

E. Teaching/Learning/Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

(Teacher is to divide components for T/L/P)

F. Examination pattern:

1. Theoretical Examination: Open book and on line.
2. Practical Examination: Conducting Experiments and Viva-Voce.

G. Reading lists:

Books:

1. *D. Kincaid and W. Cheney, "Numerical Analysis: Mathematics of Scientific Computing", 3rd Ed., AMS, 2002.*
2. *K. E. Atkinson, "An Introduction to Numerical Analysis", Wiley, 1989.*
3. *S. D. Conte and C. de Boor, "Elementary Numerical Analysis - An Algorithmic Approach", McGraw-Hill, 1981.*
4. *C.M. Bender and S.A. Orszag, "Advanced Mathematical Methods for Scientists and Engineers", McGraw-Hill Book Co., 1978.*
5. *John H. Mathews, "Numerical Methods for Mathematics Sciences and Engineering", 2^{nd} ed. Prentice Hall of India, New Delhi 2003.*
6. *M.K.Jain, S.R.K. Iyengar and R.K. Jain, "Numerical method for Scientific and Engineering Computation", New Age International Pvt. Ltd. 3^{rd} edition, 1993,*
7. *V Rajaraman, "Computer Oriented Numerical Methods", Pearson Education 3^{rd} edition , 2013*

8. *Steven C. Chapra, "Numerical Methods for Engineers", 4th Ed., McGraw Hill, 2002.*
9. *Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Prentice Hall, 2006.*
10. *Günther Hämmerlin and Karl-Heinz Hoffmann, "Numerical Mathematics", Springer-Verlag, 1991.*

Magazines:

1. *Current Science (Indian Academy of Sciences).*
2. *The Mathematics Student (Math Student) (Indian Mathematical Society).*
3. *Mathematical Spectrum(The University of Sheffield).*
4. *Mathematics Magazine (Mathematical Association of America).*
5. *+Plus magazine (University of Cambridge).*
6. *Ganithavahini (Ramanujan Mathematical Society).*

Journals:

1. *Numerische Mathematik, Springer Link.*
2. *Acta Numerica, Cambridge University Press.*
3. *SIAM Review, University of Bristol, UK.*
4. *Journal of Computational Physics, Elsevier.*
5. *SIAM Journal on Numerical Analysis, University of Bristol, UK.*
6. *SIAM Journal on Scientific Computing, University of Bristol, UK.*
7. *IMA Journal of Numerical Analysis, Oxford Journals.*
8. *Mathematics of Computation, American Mathematical Society.*
9. *Foundations of Computational Mathematics, Springer Link.*

Sixth Semester

Subject Code	Subject	P	T	L	Credit
CSE – 601	Computer Networking	2	0	3	4
CSE – 602 (I)	Software Engineering	2	0	3	4
HSS – 601	Engineering Ethics & IPR	0	0	3	3
HSS – 602	Disaster Management	0	0	2	2
CSE – 603	Creative Design	2	0	0	1
CSE – 604	Computer Graphics & Multimedia Technology	2	0	3	4
CSE – 605	Compiler Design	2	0	3	4
		1	0	17	22

Name of the Module: Computer Networking
Module Code: CSE 601
Semester: 6th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:
The course is designed to meet with the objectives of:
1. understandingthe state-of-the-art in network protocols, architectures, and applications,
2. examining and studying of different protocols in OSI and TCP/IP.
3. understanding of network addressing, mapping etc
4. understanding error control, flow control, packet recovery etc.
5. understanding the structure of LAN, WAN and MAN, and
6. understanding internetworking of devices.

B. Learning outcomes:
Students successfully completing this module will be able to:
1. learn components and rules of communications,
2. configuration and design of a small network.
3. learn about research areas and future internets research fields.
4. learn to configure NAT,DHCP, switch security, VLAN etc

C. Subject matter:
Unit I:
Basic: Introduction to Networking and its origin, layered task, Protocol stack, OSI model, TCP/IP model and brief functionality
Physical layer and media: Data, Signals, Transmission, Digital transmission- digital to digital conversion, Analog to digital conversion, bandwidth utilization and spread spectrum.
Circuit and Packet Switching:- Switched Networks, Circuit-Switching Networks, Switching Concepts, Routing in Circuit-Switched Networks, Control Signalling, Packet-Switching Principles, Routing, Congestion Control, X.25 282. , structure of a switch

Data link layer: Error correction and Detection, Data link control- framing, flow and error control, Noise less channels- Simple Protocols, Stop and wait protocol, Noisy channel protocol- Stop and Wait ARQ, Go and Back N ARQ, Selective Repeat Automatic Repeat Request, HDLC-Configuration and Transfer mode, Multiple Access-Random Access, Control access, Channelization, Wired Network, Wireless Network, Virtual LAN, Virtual Circuit Networks-Frame relay and ATM

Unit II

Network Layer: Logical Addressing, Internet Protocol (IP), Address mapping, Error reporting, and multicasting- ARP, RARP, BOOTP, DHCP, ICMP,IGMP , Network Address Translators (NAT)

Network Delivery-Delivery, Forwarding and Routing, Unicast routing protocol- Intra & inter domain routing, distance vector routing, link state routing, path vector routing, Multicast routing protocols,

Unit III

Transport layer: Process to Process delivery-Connection oriented and connection less service, UDP, TCP, SCTP, error and flow controls, Congestion control and Quality of service- Open loop congestion control, Closed loop congestion control, Congestion control in TCP and in frame relay
Quality of service-flow characteristics, flow cases, different techniques to improve QoS, RSVP.

Unit IV:

Application layer: Name Space, Domain in Namespace, Distribution of name space, DNS- generic, country and inverse domain, Resolution: Resolver, Mapping name to Address, Mapping address to names, recursive resolution.
Remote logging- telnet, Electronic mail-SMTP, POP, IMAP and file transfer- FTP architecture, commands of FTP.
WWW and HTML- Architecture, web documents, HTTP, Web services.Uniform Resource Locators (URL) and Universal Resource Identifier (URI).
Multimedia protocols- RTP, RTCP.

D. List of practicals: (Minimum eight experiments should be conducted by students)

1. Study of different types of cross-wired cable and straight through cable.
2. Study of Basic network commands and network configuration commands.
3. Socket programming using Java or C programming language.
4. Network topology configuration using Cisco packet tracer software
5. Network topology configuration of static routing using Cisco packet tracer software
6. Routing Protocol Configuration of anetwork using Cisco Packet Tracer Software (Eg. Static routing, RIP, RIP Version 2 etc)
7. Firewall Configuration using iptables and ipchains and solve different general problems in Linux OS.
8. Practical on Server Configuration Example, Web Server, Mail Server, FTP Server, DHCP, NFS etc.
9. Introduction to ns2 (network simulator) - small simulation exercises to study TCP behaviour under different scenarios and study link layer protocols such as Ethernet and 802.11 wireless LAN.
10. Experimental study of application protocols such as HTTP, FTP, SMTP, using network packet sniffers and analyzers such as Ethereal. Small exercises in socket programming in C/C++/Java.
11. Experiments with packet sniffers to study the TCP protocol. Using OS (netstat, etc) tools to understand TCP protocol FSM, retransmission timer behaviour, congestion control behaviour.

12. Basic introduction and practical's of software defined networking using mininet emulator, POX controller etc.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *C T Bhunia, "Information Technology Network & Internet", New Age International, 2006, ISBN 8122416624, 9788122416626.*
2. *Behrouz A. Fourouzan, "Data Communications and Networking", Tata McGraw-Hill Education, 2006, ISBN 0070634149, 9780070634145.*
3. *Andrew S. Tanenbaum, "Computer Networks", 4/e, Pearson education, 2003, ISBN 8131701980, 9788131701980*
4. *James F. Kurose and Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", 3/e, Pearson Education India, 2005, ISBN8177588788, 9788177588781.*
5. *S. Keshav, "An Engineering Approach To Computer Networking: ATM Networks, The Internet, And The Telephone Network", Pearson education, 2002, ISBN 8131711455, 9788131711453.*
6. *F. Halsall, Data Communication, "Computer Networks and Open Systems", Pearson, 2003, ISBN 8178080982, 9788178080987.*
7. *W.R.Stevens, Kevin R. Fall, "TCP/IP Illustated", Volume 1, 2/e, Addison-Wesley, ISBN 0132808188, 9780132808187.*
8. *Gary R. Wright, W. Richard Stevens , "TCP/IP Illustrated", Volume 2, Addison-Wesley Professional, 1995, ISBN 0321617649, 9780321617644.*
9. *Douglas Comer, "Internetworking with TCP/IP: Principles, protocols, and architecture" illustrated, Prentice Hall, 2006, ISBN 0131876716, 9780131876712.*
10. *Sam Halabi,"Internet Routing Architectures", Pearson Education India, 2008, ISBN 8131725944, 9788131725948.*
11. *Larry L. Peterson and Bruce S. Davie, "Computer Networks: A System Approach",5, revised, Elsevier, 2011, ISBN 0123850606, 9780123850607.*

Magazines:

1. *Network World, IT, United states, Massachusetts*
2. *Network Magazine, Indian Express, India*

Journals:

1. *Computer Networks Journal - Elsevier, Netherland*
2. *Journal of Network and Computer Applications - Elsevier, Netherland*
3. *Journal of Computer Networks and Communications, Elsevier, Netherland*

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Department of Computer Science & Engineering

Name of the Module: Software Engineering
Module Code: CSE 602
Semester: 6th
Credit Value: 4[P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of understanding:

1. the need of software engineering, its different life cycles and different phases,
2. to measure cost, efforts, time and team management etc,
3. testing and maintenance techniques of big projects and
4. different risks and its management systems.

B. Learning outcomes:

Students successfully completing this module will be able to learn:

1. the scope and necessity of software engineering,
2. the causes solutions for software crisis,
3. fragment problems into small units, code reusability, efficient coding and software development management and
4. different ways of software life cycles and their phases.

C. Subject matter:

Unit I:

Overview of System Analysis & Design: , Business System Concept, System Development Life Cycle, Waterfall Model, Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model.

Unit II:

System Requirement Specification: DFD, Data Dictionary, ER diagram, Process Organization & Interactions.

System Design: Problem Partitioning, Top-Down And Bottop-Up design ;Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

Unit III:

Coding & Documentation: Structured programming, OO programming, information hiding, Reuse, system documentation.

Testing: Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control.

Unit IV:

Software Project Management: Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring.

Software modelling: with Unified Modelling Language.

Case Tools: Concepts, use and application.

D. List of practicals: (Minimum eight experiments should be conducted by students)

Practicing and Modeling UML use case diagram & capturing use case scenarios: Use case diagrams, Use Case, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Relationship, Extend Relationship,| Generalization Relationship,| Identifying Actors, Identifying Use cases,E-R modeling

Practicing and Modeling DFD: Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and levelling DFD.

Estimation of test coverage metrics & structural complexity: Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits

Practicing and Designing test suite: Software Testing, Standards for Software Test Documentation, Testing Frameworks, Test Cases and Test Suite, Unit Testing, Integration Testing, System Testing, Some Remarks

E. Teaching/ Learning/ Practice pattern:

Teaching: 60%
Learning: 40%
Practice: 0%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *Roger S Pressman, "Software Engineering – A practitioner's approach", McGraw-Hill HigherEducation, 2005, ISBN: 007301933X, 9780073019338*
2. *Rajiv Mall, "Software Engineering", Prentice Hall of India. ISBN: 8120338197, 9788120338197*
3. *Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall, 2003,2nd Edition, ISBN: 013099183X, 9780130991836*
4. *Sommerville, "Software Engineering", Pearson Education 2008, ISBN: 8131724611, 9788131724613*
5. *Behforooz, "Software Engineering Fundamentals", Oxford University Press, ISBN: 0195105397, 9780195105391.*
6. *Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Software Engineering", Prentice Hall of India, 2nd Edition, ISBN: 013099183X, 9780130991836*
7. *PankajJalote, "An Integrated Approach to Software Engineering", Springer Science & Business Media, 1997, ISBN: 0387948996, 9780387948997.*
8. *Stephen R. Schach, "Object-oriented and Classical Software Engineering", Edition 8, illustrated McGraw-Hill, 2010, ISBN: 0071081712, 9780071081719*
9. *Bharat Bhushan Agarwal, Sumit Prakash Tayal, "Software Engineering", Laxmi Publications, 2009, ISBN: 8190855913, 9788190855914*
10. *ClaesWohlin, Per Runeson, Martin Höst, Magnus C. Ohlsson, BjörnRegnell, Anders Wesslén, "Experimentation in Software Engineering", Springer Science & Business Media, 2012, ISBN: 3642290442, 9783642290442*

Magazines:

1. *CrossTalk Magazine*
2. *Software Quality Engineering*
3. *Better Software Magazine*

Journals:

1. *International Journal of Software Engineering, World Scientific Publishing Co. Pte Ltd, Singapore*
2. *TSE - IEEE Transactions on Software Engineering, IEEE Computr Society, United States*
3. *ACM Sigsoft Software Engineering Notes, ACM , United States*
4. *SPE - Software - Practice and Experience*

Name of the Module: Engineering Ethics & IPR
Module Code: HSS 601
Semester: 6th
Credit Value: 3 [P=0, T=0, L=3]

A. Objectives:

The course is designed to meet the objectives of:

1. imparting theoretical lectures with case discussion.
2. providing teaching with inclusive learning.
3. making students aware about the importance of this subject in their future

B. Learning outcomes:

Students successfully completing this module will be able to :

1. work with efficiency as they had knowledge of the subject.
2. with the backup knowledge their performance will definitely be much better in their workplace.

C. Subject matter:

Unit I:

Engineering as a profession, historical and social context, Ethics in Engineering,

Codes of Engineering Ethics, history and purpose, consequentialism and utilitarianism, Deontological approaches, duties, rights and respect for a person, responsibility, virtue Ethics, honesty, moral autonomy, obligations of Engineering profession and moral propriety.

Unit II:

Engineer's moral responsibility for safety and human right, risk assessment and communication, product liability, development ethics, engineers and employer relationship, whistle blowing and its moral justifications.

Unit III:

Computer Ethics: Social impact of computers, Computer and gender issues, n privacy, cyber crime, ethical use of software's, intrinsic value of nature.

Unit IV:

IPR I: Intellectual property, definition, types, rights and functions, patents, trademark, software design, industrial designs, semi-conductor and integrated circuits layout design, grant of patent in India, authority and procedure, patent forms, surrender and revocation of patents and compulsory licensing, acquision of inventions by the Government.

IPR II: Contents of draft application for patents, Drafting patent specification and claims, WTO and drafting patent specification and claims, IPR in fringement and piracy under Indian Laws.

D. Teaching/ Learning:

1. Teaching : 50%

2. Learning/ case presentation : 30%
3. Assignment : 10%
4. Attendance : 10%

E. Examination pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading lists:

Books:

1. *Chowdhury, Subir, Blending the best of the East & West, EXCEL*
2. Ghosh, Vikas, Ethics and Mgmt. & Indian Ethos,
3. Pherwani, Business Ethics, EPH
4. Balachandran Raja,Nair, Ethics, Indian Ethos and Mgmt., Shroff Publishers
5. Velasquez, Business Ethics: concept and cases, Pearson
6. William Cornish, Intellectual Property Rights, Sweet & Maxwell; 7th Revised edition

Magazine:

1. *Industry Week*
2. *Business Ethics magazine*
3. *The Weekly Standard*
4. *Harpers*
5. *The Week*

Journals:

1. *Journal of Business Ethics*
2. *The Journal of Ethics*
3. *Ethics, University of Chicago Press*
4. *Kennedy Institute of Ethics Journal*
5. *Journal of Global Ethics*

Name of the Module: Disaster Management
Module Code: HSS 602
Semester: 6th
Credit Value: 2 [P=0, T=0, L=2]

A. Objectives:

The course is designed to meet the objectives of:

1. Imparting theoretical lectures with case discussion.
2. Providing teaching with inclusive learning.
3. Making students aware about the importance of this subject in the future prospect

B. Learning outcomes:

Students successfully completing this module will be able to :

1. Students will be able to work with efficiency as they had knowledge of the subject.

2. With the backup knowledge their performance will definitely be much better in their workplace.

C. Subject matter:

Unit I:

Introduction: Disaster preparedness, Goals and objectives of ISDR Programme, Risk identification, Risk sharing.

Disaster and development: Development plans and disaster management. Alternative to dominant approach, disaster-development linkages, Principle of risk partnership

Unit II:

Disaster management and risk reduction in garment industry: Types of disasters and disaster plans: Processing machines and utilities. Sustainable livelihoods and their Protection – Recovery from disaster –fire, boiler mishap. Garment Industry health monitoring and Disaster aids.

Unit III:

Awareness of risk reduction: Trigger mechanism, constitution of trigger mechanism, risk reduction by education, disaster information network, risk reduction by public awareness.

Unit IV:

Development planning on disaster: Implication of development planning, financial arrangements, areas of improvement, disaster preparedness, community based disaster management, emergency response.

Seismicity: Seismic waves, Earthquakes and faults, measures of an earthquake, magnitude and intensity ground damage, Tsunamis and earthquakes

D. Teaching/ Learning/Practice pattern:

1. Teaching : 50%
2. Learning/ case presentation : 30%
3. Assignment : 10%
4. Attendance : 10%

E. Examination pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading lists:

Books:

1. *White, Gilbert F. and J. Eugene Hass, 1975, Assessment of Research on Natural Hazards, Cambridge, the MIT Press, MA.*
2. *White, G.F, 1974, Natural Hazards: Local, National, Global, Oxford University Press, New York. 2. Taori, K (2005) Disaster Management through Panchayati Raj, Concept Publishing Company, New Delhi.*
3. *Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.*
4. *Kasperson, J.X., R.E. Kasperson, and B.L. Turner III (Eds.), 1995, Regions at Risk: Comparisons of Threatened Environments, United Nations University Press, Tokyo*
5. *Singh Satendra (2003): Disaster Management in the Hills, Concept Publishing Company, New Delhi.*
6. *Pardeep Sahni, Madhavi Malalgoda and Aariyabandu, Disaster risk reduction in south Asia, PHI, 2009*
7. *Amita Sinvhal, Understanding Earthquake Disasters, TMH, 2010.*
8. *MHA, GOI-UNDP, Disaster Management in India, 2009*

9. *NDMA, 'Incident Response Guidelines', 2009*
10. *Disaster Management Act, 2005.*

Magazines:

1. *Crises and Disaster Management Magazine*
2. *Emergency Management*

Journals:

1. *Asian Journal of Environment and Disaster Management*
2. *International Journal of Disaster management*
3. *IDRIM Journal*
4. *Journal of Disaster Risk Studies*
5. *Emergency Management Review*

Name of the Module: Creative Design
Module Code: CSE 603
Semester: 6th
Credit Value: 1[P=2, L=0, T=0]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to give students broad but comprehensive theoretical analysis, ideas & practical design & implementation of useful computer systems,
2. to impart the essential knowledge of computer system design with the fine arts & analysis to enhance hands on experience & to encourage innovations.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. take up innovative project for designing computer systems of varied nature.
2. learn system analysis, system design, fine arts etc.

C. Subject matter:

Unit: 1

System analysis: Requirement analysis, Scope definition, Logical Design, Business Analysis, Accident Analysis, Problem analysis, Decision analysis, policy analysis.

Different tools to represent in creative system design

Unit: 2

System Design: Physical design, Logical design, Alternative Design analysis: Rapid Application development (RAD), Joint application design (JAD), System Development Life cycle (SDLC).

Unit: 3

Creative Design: Creative design process, Hypothesis techniques and methods, Hypothesis Testing, Creative design Life cycle and phases.

Unit: 4

Fine arts: Fine arts rules and entities, colour composition, 2d 3d animation, Portrait sketch. Create any model for any perspective of engineering fields with some innovation.

D. Teaching/ Learning/Practice pattern:

Practical: 30%
Presentation: 40%
Assignment: 30%

E. Examination pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading lists:
Books:

Magazines:

Journals:

Name of the Module: Computer Graphics & Multimedia Technology
Module Code: CSE 604
Semester: 6th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of:

1. introducing graphical techniques such as modelling, representation, illumination, shadowing, rendering and texturing,
2. to learn two dimensional and three dimensional computer graphics with comprehend advanced software tools of computer graphics.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. comprehend mathematical basics which are used in computer graphics and also learnhow to use them in designing computer graphics programs.
2. create graphics programming using OpenGL.
3. describe basic graphics principles which are used in games, animations and film making.

C. Subject matter:

Unit I:

Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures; color models; storage tube graphics display, Raster scan display, printers etc.; Active & Passive graphics devices; Computer graphics software.

Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Unit II:

2D transformation & viewing: Basic transformations: translation , rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines , parallel lines, intersecting lines; clipping operations, point clipping , line clipping, clipping circles , polygons & ellipse.

3D transformation& viewing: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing

Unit III:

Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

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

Unit IV:

Introduction to Multimedia: Concepts, uses of multimedia, text representation; Image, video and audio standards.

Audio: digital audio, MIDI, processing sound, compression.

Video: MPEG compression standards, various compression techniques.

D. List of practicals: (Minimum five experiments should be conducted by students)

1. Point plotting, line & regular figure algorithms
2. Raster scan line & circle drawing algorithms
3. Clipping & Windowing algorithms for points, lines & polygons
4. 2-D / 3-D transformations
5. Simple fractals representation
6. Filling algorithms
7. Graphics programming using OpenGL.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson education.*
2. *Foley, Vandam,Feiner, Hughes – "Computer Graphics principles (2nd Ed.) – PearsonEducation.*
3. *Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – Tata McGraw Hill*
4. *D. F. Rogers, J. A. Adams – " Mathematical Elements for Computer Graphics (2nd Ed.)" – Tata McGraw Hill*
5. *Mukherjee Arup, Introduction to Computer Graphics, Vikas*
6. *Hill,Computer Graphics using open GL, Pearson Education*
7. *W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – Tata McGraw Hill.*
8. *Computer Graphics and Multimedia: Applications, Problems and solution by John DiMarco, Idea Group Publication.*
9. *Computer Graphics, Multimedia and Animation by Malay K. Pakhira, Prentice-Hall*
10. *Multimedia, Computer Graphics and Broadcasting, by Taihoonkim, HojjatAdeli*

Magazines:

1. *IEEE Multi Media Magazine, IEEE Computer Society, United State*
2. *IEEE Computer Graphics and Applications Magazine, IEEE Computer Society, United State*

Journals:

1. *International Journal of Graphics and Multimedia (IJGM)*
2. *SERSC: International Journal of Computer Graphics, SERSC, Spain*
3. *International journal of Graphics and Image Processing, IFRSA, London, UK*

Name of the Module: Compiler Design
Module Code: CSE 605
Semester: 6th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet with the objectives of:

1. providing a thorough introduction to the theory and practice of programming language translation and to provide extensive hands-on experience with compiler construction tools and techniques,
2. introducing to the design and implementation of programming language translators,
3. learn theoretical aspects of language design and translation are discussed and practically demonstrated by developing a working compiler and grasp of compiler construction.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. design lexical and syntax analyzer phases of complier.
2. demonstrate the basic notions and techniques for programming language translation
3. demonstrate the basic notions and techniques for intermediate code generation.
4. generate and program a small compiler or interpreter.

C. Subject matter:

Unit I:

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

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). Push Down Automata with working principle architecture.

Unit II:

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 director definitions: Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes. Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions.

Unit III:

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

Unit IV:

Code optimization: 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.

Issues in the design of code generator: a simple code generator, Register allocation & assignment.

D. List of practicals: (Minimum ten experiments should be conducted by students)

1. Write a program for dividing the given input program into lexemes.
2. Write a program to compute FIRST function.
3. Write a program to compute FOLLOW function.
4. Write a program to implement operator precedence parsing.
5. Write a program on recursive descent parsing.
6. Write a program to design LALR bottom up parser.
7. Write a program to implement lexical analyzer using LEX tool.
8. Write a LEX program to identify a simple and a compound statement.
9. Write a LEX program to count the number of keywords and identifiers in a sentence.
10. Write a LEX program to convert an octal number into decimal number.
11. Write a YACC program to check the validity of an arithmetic expression.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education, ISBN 8131759024, 9788131759028.*
2. *Holub - "Compiler Design in C", Prentice-Hall Of India Pvt. Limited, 2006, ISBN 812030778X, 9788120307780.*
3. *TorbenÆgidiusMogensen, "Introduction to Compiler Design", Springer Science & Business Media, 2011, ISBN 0857298291, 9780857298294.*
4. *Steven S. Muchnick, Advanced Compiler Design Implementation, Morgan Kaufmann, ISBN 1558603204, 9781558603202.*
5. *Robert Morgan. Building an Optimizing compiler,Butterworth-Heinemann, ISBN 155558179X, 9781555581794.*
6. *Keith Cooper, Linda Torczon, Cooper and Torczon. Engineering a compiler,Elsevier, 2011, ISBN 0080916619, 9780080916613.*
7. *Andrew W. Appel, Maia Ginsburg, Modern Compiler Implementation in C, Cambridge University Press, ISBN 0521607655, 9780521607650.*

Magazines:

1. *IBM Systems Magazine, IBM, USA*

Journals:

1. *IEEE Explore - Compiler design issues for embedded processors, IEEE Computer Society , United State*
2. *International Journal of Computer Applications, world Scientific, Singapore*
3. *ACM TOPLAS, ACM, United State*

Seventh Semester

Subject Code	Subject	P	T	L	Credit
CSE – 701 **(I)**	Internet & Web Technology	2	0	3	4
HSS – 701	Mass Communication for Technology	0	0	3	3
XXX – 701	Research Paper Communication	2	0	0	1
CSE- - 7XX	Elective – I	0	0	3	3
CSE- - 7XX	Elective – II	0	0	3	3
CSE- - 702	Cryptography & Network Security	2	0	3	4
CSE- - 703	AI & Neural Network	2	0	3	4
		8	0	18	22

Name of the Module: Internet & Web Technology
Module Code: CSE 701
Semester: 7th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to complete an in-depth knowledge of web technology,
2. to know and to have the idea for different web application that most web developers are likely to use,
3. to be aware of, and to have used, the enhancements of the web applications,
4. to know the different types of web application software.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. develop client/server applications
2. update and retrieve the data from the databases using SQL
3. develop server side programs in the form of servlets

C. Subject matter:

Unit I:

Introduction to HTML: HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

Introduction to Java: Scripts, Objects in Java Script, Dynamic HTML with Java Script

Unit II:

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's

Unit III:

Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, and Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues,

Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

Unit IV:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

Database Access: Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework.

D. List of practicals:

1. Basic use of html tag, linking image table, frame, form design.
2. DHTML- inline styles, creating style sheets with the style element, linking external style sheet, positioning elements, user style sheet.
3. Creating event handler that responds to mouse and keyboard event: Onload, on mouse over, on mouse out, on focus, on blur, on submit, on result, on click, on change.
4. Structuring data with xml, xml parser, extensible style language (xsl); customising markup language.
5. Configuring apache-tomcat server.
6. Building simple jsp: Declaring variables and methods in jsp, inserting java expression in jsp, processing request from user, generating dynamic response for the user. Accessing database from jsp, inserting applet into jsp.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

Reading Lists:

Books

1. *Xavier C, "Web Technology & Design", New Age Publication.*
2. *"Java Server Programming, J2EE edition. (VOL I and VOL II)", WROX publishers.*
3. *Chris Bates, "Web Programming, building internet applications, 2nd edition", WILEY Dreamtech*
4. *Patrick Naughton and Herbert Schildt, "The complete Reference Java 2 Fifth Edition", McGraw-Hill Education*
5. *Hans Bergsten "Java Server Pages", SPD O'Reilly.*
6. *Dietel and Nieto, "Internet and World Wide Web – How to program", PHI/Pearson Education Asia*
7. *JoclSklar, "Web Warrier guide to web design technologies", Cengage Learning, New Delhi*
8. *Ian Graham, "The XHTML 1.0 Web Developement Sourcebook", Wiley*
9. *Ian Graham and Liam Quin, "The XML Specification Guide", Wiley*
10. *Ian Graham, John, "The HTML Stylesheet Sourcebook", Wiley and Sons*

Magazines:

1. *Digital Web Magazine, Nick Finck, United State*

Journals:

1. *International Journal of Information Technology and Web Engineering (IJITWE), Information Resources Management Association,*
2. *Journal of Web Semantics - Elsevier, Netherland*

Name of the Module: Mass Communication for Technology
Module Code: HSS 701
Semester: 7th
Credit Value: 3[P=0, T=0, L-3]

A. Objectives:

The course is designed to meet the objectives of:

1. Imparting theoretical lectures with case discussion.
2. Teaching with inclusive learning.
3. Making students aware about the importance of this subject in their future career.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. Students will be able to work with efficiency as they had knowledge of the subject.
2. With the backup knowledge their performance will definitely much better in their workplace.

C. Subject matter:

Unit-1:

Fundamentals of Mass Communication- Definition of Mass Communication, importance, scope, importance, related fields, history of mass communication.

Unit-II:

Dissemination of Scientific & Technical knowledge (DSTK): Difficulties with distribution of scientific and technical information is rapid increasing with unprecedented spade of science and technology. Further, engineers are made to meet with this challenge. The subject should cover the knowledge so as to establish adequate and effective distribution of information. Lack of information cannot make a sound engineer. Engineers should be specialists in information dissemination for which a course on DSTK is of paramount importance. Engineers should be made to write articles and research papers fluently and confidently. They should be taught to organize seminar and conferences deliver talks as well in the seminars and conferences. They should also be taught the technique of publishing magazines and journals.

D. Teaching/ Learning/ Practice pattern:

1. Teaching : 50%
2. Learning/ case presentation : 30%
3. Assignment : 10%
4. Attendance : 10%

E. Examination pattern:

1. Theoretical Examination : 50
2. Class test : 30
3. Assignment : 20

F. Reading lists:

Books:

1. *Murthy, D.V.R. Development of Journalism, Dominant Publishers, 2001*
2. *Naarula, Uma. Development Communication Theory and Practice, Har-Anand Publication Ltd New Delhi; 1990.*
3. *Sharma, Suresh Chandra, Media Communication and Development, Rawat Publication, 1987.*
4. *UNESCO, 'Different Theories and Practice', 1982.*

Magazines:

1. *Media and Communication*
2. *Communication Magazine*

Journals:

1. *Mass Review*
2. *Journal of Communication Studies*
3. *Mass Communication and Society*
4. *Journal of Mass Communication*
5. *Communicator*
6. *Journal of Communication*

Name of the Module: Research Paper Communication
Module Code: XXX-701
Semester: 7th
Credit Value: 1[P=2, T=0, L=0]

A. Objectives:

The course is designed to meet the objectives of:

1. Business research is a process of planning, acquiring, analyzing and disseminating relevant data, information and insights to decision makers in ways that mobilize the organization to take appropriate actions that, in turn, maximize business performance.
2. Making students aware about the importance of this subject in their future career.

B. Learning outcomes:

Students successfully completing this module will be able to :

1. Understanding of Research process and types
2. Formulate the research problem
3. Design the research
4. Able to collect data
5. Analyze the data using SPSS
6. Interpret the results
7. Write the report

C. Subject matter:

Unit 1:

Introduction to Business Research-Meaning and Significance of Research in Business; Different Approaches to Research – Scientific Methods and Non-scientific Methods;

Data Collection in Classroom: Principles and purposes, description, strengths and limitations, where and how to begin data collection, designing suitable instruments, recording data, data maintenance.

Unit II:
The Research Problem and Design-Formulation and Definition of Business Research Problem; Formulation of Research Hypotheses, Business Research Design – Meaning and Formulation

Unit III:
Sampling Design and Measurement Techniques- The Sampling Design Process; Types of Sample Design –Probability and Non-probability Sampling Designs.

Unit IV:
Data Collection Tools and Data Processing-Questionnaires and Observation Forms; Questionnaire Design Process;

Unit V:
Analysis of Data- Basic Data Analysis – Descriptive Statistics; Univariate Statistics – Hypotheses Testing; Bivariate Analysis – Test of Differences and Measures of Association; Multivariate Analysis.
Unit VI:
Business Research Report-Importance of the Report & Presentation; Business Report Format; Report Writing; Oral Presentation; Research Follow-up

D. Teaching/ Learning/ Practice Pattern:

1.	Teaching	: 50%
2.	Learning/ case presentation	: 30%
3.	Assignment	: 10%
4.	Attendance	: 10%

E. Examination pattern:

1.	Theoretical Examination	: 50
2.	Class test	: 30
3.	Assignment	: 20

F. Reading lists:

Books:

1. *Zikmund, Babin, Carr & Griffin. Business Research Methods, Cengage Learning. 8th Edition.*
2. *Bryman & Bell. Business Research Methods, Oxford. 3rd Edition.*
3. *Cooper & Schindler. Business Research Methods, TMH*
4. *C.R. Kothari, Research Methodology: Methods and Techniques,New Age International*,

Magazines:

1. *R & D Magazine*
2. *Research Magazine*
3. *Scientific Magazine*

Journals:

1. *Mass Review*
2. *Journal of Communication Studies*
3. *Mass Communication and Society*

4. *Journal of Mass Communication*
5. *Communicator*
6. *Journal of Communication*

Name of the Module: Cryptography & Network Security
Module Code: CSE 702
Semester: 7th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. security breaches can be very expensive in terms of business disruption and the financial losses that may result,
2. increasing volumes of sensitive information are transferred across the internet or intranets connected to it,
3. networking that make use of internet links are becoming more popular because they are cheaper than dedicated leased lines. This, however, involves different users sharing internet links to transport their data,
4. directors of business organizations are increasingly required to provide effective information security.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. identify some of the factors driving the need for network security,
2. identify and classify particular examples of attacks,
3. define the terms vulnerability, threat and attack,
4. identify physical points of vulnerability in simple networks,
5. compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems,
6. explain the implications of implementing encryption at different levels of the OSI reference mode,
7. explain what is meant by data integrity and give reasons for its importance,
8. describe methods of providing assurances about data integrity,
9. describe the use of hash functions and explain the characteristics of one-way and collision-free functions,
10. describe and distinguish between different mechanisms to assure the freshness of a message,
11. explain the role of third-party agents in the provision of authentication services,
12. discuss the effectiveness of passwords in access control and the influence of human behaviour,
13. identify types of firewall implementation suitable for differing security requirements,
14. apply and explain simple filtering rules based on IP and TCP header information,
15. distinguish between firewalls based on packet-filtering routers, application level gateways and circuit level gateways.

C. Subject matter:

Unit I:

Introduction of Information Security, Cryptography, Conventional Encryption, Symmetric key cipher: Traditional technique: Substitution cipher, Transmission cipher, Stream Cipher, Block Cipher, Roaster Machine.

Unit II:

Modern Symmetric Techniques, Mathematics of symmetric key cryptography, Cryptanalysis of classical ciphers, General Attacks, Secret and Private Key Cryptography, DES, Modes of operation of DES, Automatic Variable Key, Proof of DES, Merits and Demerits of DES, Quantification of Performance, TDES, Advanced Encryption Standard/AES, Comparison of Secret Key Systems, Modes of operation of AES Limitations of AES, Limitation of Secret or Private Key Crypto systems.Asymmetric key cryptography: Mathematics of Asymmetric key cryptography, Public Key Cryptography RSA Algorithm, Limitations of RSA Algorithm, Comparison of RSA and TRAP DOOR Public Key Crypto systems, Rabin Cryptosystem, ElGamal Cryptosystem, Elliptic Curve Cryptosystems.

Unit III:

Key management: Key Transport Protocols, Needham Schroeder Protocol, Key Agreement Protocol, Diffie -Hellman Protocol, Station to Station Protocol, Merkless Puzzle Technique of key agreement, Public Key Distribution, Message integrity and message authentication, Cryptography hash function, Digital Signature, Entity Authentication.

Unit IV:

Networks security: Application Layer: PGP and S/MIME, Transport Layer: SSL and TLS, Network Layer: IPSec, Advanced Error Control Techniques in Network.

D. List of practicals:

(i). Finding GCD of two integer numbers: Euclidian and Extended Euclidian Algorithm, Finding the inverse: Additive and multiplicative

(ii). Traditional Symmetric Cipher techniques:

a) Mono alphabetic Cipher: Additive, Multiplicative, Affine
b) Poly alphabetic Cipher: Autokey cipher, Playfair cipher, Hill cipher, Vigenere cipher.
c) Transposition cipher

(iii). Modern Symmetric Encryption: Data Encryption (DES), Advance Encryption Standard (AES).

(iv). Asymmetric Cipher: RSA, Elgamal, Rabin, Elliptic Curve Cryptosystem.

(v). Digital Signatures: RSA digital signature scheme, Elgamal digital signature, etc.

(vi). Entity Authentication: Challenge response, Zero knowledge, etc

(vii). Key management: Diffie- Hellman, etc.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading lists:

Books

1. *C.T. Bhunia, "Information Technology Network & Internet", New Age Publication, 2006.*
2. *AtulKahate,"Cryptography and Network Security", Tata McGraw-Hill Education, 07-2008.*
3. *Michael Erschloe, "Information Warfare: How to Survive Cyber Attacks", Osborne/McGraw-Hill, 2001.*
4. *Brian Hatch, James Lee and George Kurtz, "Hacking Exposed : Linux: Linux Security Secrets and Solutions", Osborne McGraw-Hill, 1983.*
5. *Kenneth R. Van Wyk, Richard Forno, "Incident Response", O'Reilly, 2001.*
6. *Kevin Mandia, Chris Prosise, "Incident Response: Investigating Computer Crime", Osborne/McGraw-Hill, 2001.*
7. *Mike Schiffman, "Hacker's Challenge", McGraw Hill Professional, 2002.*
8. *Julia Allen, "The CERT Guide to System and Network Security Practices" Addison-Wesley, 2001.*
9. *Richard E. Smith "Authentication: From Passwords to Public Keys", Addison-Wesley, 2002.*
10. *Stuart McClure, Saumil Shah, ShreerajShah ,"Web Hacking: Attacks and Defense", Addison-Wesley Professional, 2003 .*
11. *Mike Shema, Bradley C. Johnson, Keith J. Jones, "Anti Hacker Tool Kit: Key Security Tools and Configuration Techniques", San Val, Incorporated, 2002.*

Magazines:

1. *Information Security - SC Magazine, Haymarket Media Inc., United State*
2. *InfoSec Magazines, United Kingdom*

Journals:

1. *Journal of Computer Security, IOS press, Netherland*
2. *International Journal of Information Security - Springer, United State*
3. *Journal of Information Security and Applications - Elsevier, Netherland*

Name of the Module: Artificial Intelligence & Neural Network
Module Code: CSE 703
Semester: 7th
Credit Value: 4 [P=2, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To introduce the fundamental concepts of artificial intelligence;
2. To equip students with the knowledge and skills in logic programming using Prolog;
3. To explore the different paradigms in knowledge representation and reasoning;
4. To understand the contemporary techniques in machine learning;
5. To evaluate the effectiveness of hybridization of different artificial intelligence techniques.

B. Learning outcomes:

1. understand the history, development and various applications of artificial intelligence;

2. familiarize with propositional and predicate logic and their roles in logic programming;
3. understand the programming language Prolog and write programs in declarative programming style;
4. learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems;
5. appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, techniques based on probability theory and possibility theory (fuzzy logic);
6. master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and genetic algorithm;

C. Subject matter:

Unit I:

Artificial Intelligence (AI): its roots and scope : Early history and applications; the development of formal logic; the Turing test; overview of AI application areas: game playing, automated theorem proving, expert systems, natural language understanding and semantics, planning and robotics, and machine learning.

Unit II:

Knowledge representation: Technique using semantic network & conceptual dependency :The Propositional Calculus and Predicate Calculus; using inference rules to produce predicate calculus expressions; strategies and structures for state space search; heuristic search; ie; DFS, BFS, bidirectional search, Best first search, A & A* algorithm, problem reduction AO* search, constraint satisfaction, Mini Max search, recursion-based search; admissibility, monotonicity and informedness of search algorithms.

Unit III:

Knowledge representation and reasoning: Rule-based production systems; case-based reasoning systems and model based reasoning systems; reasoning under uncertain situations: stochastic methods, fuzzy logic and fuzzy set theory; fuzzy expert systems.

Machine learning : Decision tree induction algorithms; artificial neural networks; genetic algorithms.

Unit IV:

Hybrid: intelligent techniques and maintenance of intelligent systems :Hybridization of neural networks, fuzzy logic, genetic algorithms and other intelligent techniques for problem solving; maintenance of the completeness, correctness and consistency of intelligent systems.

D. List of practicals:

1. Simulate DFS
2. Simulate BFS
3. Simulate A*
4. Simulate 8- Puzzle Problem
5. WAP to implement and function using ADALINE with BIPOLAR inputs and outputs
6. WAP to implement and function using MADALINE with BIPOLAR inputs and outputs
7. WAP to implement discrete Hopfield network and test for input patterns
8. Write a programme to implement fuzzy set operation and properties
9. Write a programme to implement composition of fuzzy and crisp relations.
10. WAP to perform MAX-MIN composition of two matrices obtained from Cartesian product.
11. Write a programme for maximizing $f(x) = x^2$ using GA where x is ranges from 0 to 31 perform only 5 iteration.

E. Teaching/ Learning/ Practice pattern:

Teaching: 40%

Learning: 10%
Practice: 50%

F. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading Lists:

Books

1. *Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw Hill Companies Inc.*
2. *stuart Russell and Peter Norving, "Artificial Intelligence: A Modern Approach", Prentice Hall.*
3. *Davin Poole, Alan Mackworth, and Randy Goebel, "Computational Intelligence: A logical Approach", Oxford University Press.*
4. *George F. Luger, "Artificial Intelligence: structure and Strategies for Complex Problem Solving", Addison-Wesley, 2005, ISBN: 0321263189, 9780321263186*
5. *Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann, 1998, ISBN: 1558605355, 9781558605350*
6. *Thomas Dean, "Artificial Intelligence: Theory and Practice", Addision- Wesley.*
7. *Mike Sharples, et al, "Computers and Thought: A practical Introduction to Artificial Intelligence", A Bradford Book , 1989*
8. *Xin-Xing Tang (ed.), "Virtual Reality: Human Computer Interaction", InTech , 2012*
9. *Ray Kurzweil, "The Age of Intelligent Machines", The MIT Press , 1992*
10. *David Poole, Alan Mackworth, "Artificial Intelligence: Foundations of Computational Agents" Cambridge University Press , 2010*

Magazines:

1. *AI Magazine - Association for the Advancement of Artificial Intelligence, AAAI Press, USA*
2. *IEEE Intelligent Systems Magazine, Computer Society, United State*

Journals:

1. *Artificial Intelligent by Elsevier, Netherland*
2. *Artificial Intelligent in medicine by Elsevier, Netherland*
3. *Journal of Artificial Intelligent Research(JAIR) , AAAI Press, USA*
4. *Applied Soft Computing - Journal - Elsevier, Netherland*

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ELECTIVE – I

Name of the Module: Bio-Informatics
Module Code: CSE 701A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To introduce the fundamental concepts of Bioinformatics,
2. To equip students with the software of Bioinformatics,
3. To explore the different paradigms in Data mining, HMM, Biocomputing.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. know concepts of genomics and proteomics,
2. describe bioinformatics algorithms such as dynamic programming, hidden markov models and monte carlo,
3. utilize bioinformatics tools such as Pymol, Blast, and ClustalW,
4. code solutions to bioinformatics problems utilizing tools such as R, biopython, bioperl,
5. do research areas in bioinformatics.

C. Subject matter:

Unit -I

Introduction to Bioinformatics: Definition and History of Bioinformatics, Internet and Bioinformatics, Introduction to Data Mining, Applications of Data Mining to Bioinformatics Problems and Applications of Bioinformatics

Unit –II

Bioinformatics Softwares: Clustal V, Clustal W 1.7, RasMol, Oligo, Molscript, Treeview, Alscript, Genetic Analysis Software, Phylip

Unit -III

Biocomputing: Introduction to String Matching Algorithms, Database Search Techniques, Sequence Comparison and Alignment Techniques, Use of Biochemical Scoring Matrices, Introduction to Graph Matching Algorithms, Automated Genome Comparison and its Implication, Automated Gene Prediction, Automated Identification of Bacterial Operons and Pathways; Introduction to Signalling Pathways and Pathway Regulation. Gene Arrays, Analysis of Gene Arrays

Unit -IV

Markov chains and applications: Systems Biology-an introduction
Machine Learning Methods, Hidden Markov models, Applications of HMM in gene identification and Profiles HMMs, Neural Networks and Support Vector machines

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists :

Books

1. Claverie, J.M. and Notredame C. 2003 Bioinformatics for Dummies. Wiley Editor.
2. Letovsky, S.I. 1999 Bioinformatics. Kluwer Academic Publishers.
3. Baldi, P. and Brunak, S. 1998 Bioinformatics. The MIT Press.
4. Setubal, J. and Meidanis, J. 1996 Introduction to Computational Molecular Biology. PWS Publishing Co., Boston.
5. Lesk, A.M. 2002 Introduction to Bioinformatics. Oxford University Press.
6. Rastogi, S.C., Mendiratta, N. and Rastogi, P. 2004 Bioinformatics: Concepts, Skills & Applications. CBS Publishers & Distributors, New Delhi.
7. Vyas, S.P. and Kohli, D.V., Methods in Biotechnology and Bioengineering.
8. Singer, M. and Barg, P. Exploring Genetic Mechanism.
9. Fogel, G.B. and Corne, D.W., Evolutionary Computation in Bioinformatics.
10. Genetic Library Construction and Screening: Advanced Techniques and Applications: Lab Manual
11. Patterson, B.K., Techniques in Quantification and Localization of Gene Expression.
12. Mont, D.W., Bioinformatics: Sequence and Genome Analysis.
13. Evens, W.J. and Grant, G.R., Statistical Methods in Bioinformatics: An Introduction.
14. Liu, B.H., Statistical Genomics: Linkage Mapping and QTL Analysis
15. Bowtell, D. and Sambrook, J. DNA Microarrays.
16. Pierre Baldi and Soren Brunak, Bioinformatics: The Machine Learning Approach.
17. Jae K. Lee, Statistical Bioinformatics, John Wiley & Sons Inc.

Magazines:

Journals:

1. *International Journal of Bioinformatics Research and Applications, inderscience publication, Switzerland*
2. *Journal of Bioinformatics and Computational Biology, world scientific publishing Co., Singapore.*
3. *Journal of Bio technology, Elsevior.*

Name of the Module: Quantum Computing
Module Code: CSE702A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to understand the building blocks of a quantum computer.
2. to understand the principles, quantum information and limitation of quantum operations formalizing.
3. to understand the quantum error and its correction.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand and explain the basic notions of Quantum Computing-including Quantum Bits and registers, Quantum Evolution, Quantum Circuits, Quantum Teleportation and the basic Quantum Algorithms known at the present time,
2. identify the essential difference between the classical paradigm and the quantum paradigm of computation and appreciate why quantum computers can solve currently intractable problems.
3. know different kinds of synthesis techniques and algorithms.
4. design different reversible circuits using different simulators eg. Revkit, JQuantum etc.

C. Subject matter:

Unit I:

Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms.

Unit II:

Quantum Computation: Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement, Universal Quantum
Gates, Simulation of Quantum Systems, Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of NP – complete problems – Quantum Search for an unstructured database.

Unit III:

Quantum Computers: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

Quantum Information : Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations, Examples of Quantum noise and Quantum Operations – Applications of Quantum operations, Limitations of the Quantum operations formalism, Distance Measures for Quantum information.

Unit IV:

Quantum Error Correction : Introduction, Short code, Theory of Quantum Error –Correction, Constructing Quantum Codes, Stabilizer codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.

F. Reading lists:

Books:

1. *C.T. Bhunia, "Quantium Computing", New Age International Publishers, ISBN-10: 8122430759, ISBN-13: 978-8122430752*
2. *Micheal A. Nielsen. & Issac L. Chiang, "Quantum Computation and Quantum Information", Cambridge University Press, 2010, ISBN: 1139495488, 9781139495486.*

3. *Mika Hirvensalo, "Quantum Computing", Springer Science & Business Media, 2013, ISBN: 3662096366, 9783662096369*
4. *Sahni, "Quantum Computing", Tata McGraw-Hill Education, 2007, ISBN: 0070657009, 9780070657007*
5. *Colin P. Williams, "Explorations in Quantum Computing", Springer Science & Business Media, 2010, ISBN: 1846288878, 9781846288876*
6. *Phillip Kaye, Raymond Laflamme, Michele Mosca, "An Introduction to Quantum Computing" , Oxford University Press, 2007*
7. *Giuliano Benenti, Giulio Casati, Giuliano Strini, "Principles of Quantum Computation and Information", World Scientific, 2004.*
8. *Noson S. Yanofsky, Mirco A. Mannucci," Quantum Computing for Computer Scientists", Cambridge University Press, 2008*
9. *N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007*
10. *Jiannis K. Pachos," Introduction to Topological Quantum Computation", Cambridge University Press.*
11. *Marinescu Dan C.," Approaching Quantum Computing", Pearson Education*
12. *Salvador Elías Venegas-Andraca, "Quantum Walks for Computer Scientists", Morgan & Claypool.*
13. *Eleanor G. Rieffel, Wolfgang H. Polak, "Quantum Computing: A Gentle Introduction", MIT Press, 2011, ISBN: 0262015064, 9780262015066*

Magazines:
1. Cosmos, Australia.
2. The Quantum Quest for a Revolutionary Computer, Time.

Journal:
1. *Quantum information and Computing, Rinton press, New Jersey, US, ISSN: 1533-7146*
2. *Information and Computation, Elsevier, ISSN:0890-5401*
3. *The Future of Quantum Information Processing, Science (Special Issue).*
4. *The IEEE Journal of Quantum Electronics, IEEE*

Name of the Module: Robotics
Module Code: CSE703A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:
The course is designed to meet the objectives of:
1. understand the basic concepts associated with the design and functioning and applications of Robots,
2. study about the drives and sensors used in Robots,
3. learn about analyzing robot kinematics and robot programming.

B. Learning outcomes:
Students successfully completing this module will be able to:
1. perceive human states using multimodal interfaces,
2. model and recognise human actions,

3. use adaptive shared control methods to assist humans in their task,
4. use learning algorithms to improve their performance through interaction with humans.

C. Subject matter:

Unit I:

Fundamentals Of Robot : Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Functions – Need for Robots – Different Applications

Unit II:

Robot Drive Systems And End Effectors: Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of Drives End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations

Unit III:

Sensors And Machine Vision : Requirements of a sensor, Principles and Applications of the following types of sensors – Position of sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Camera, Frame Grabber,
Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis – Data Reduction: Edge detection, Feature Extraction and Object Recognition - Algorithms. Applications – Inspection, Identification, Visual Serving and Navigation.

Unit IV:

Robot Kinematics And Robot Programming: Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems. Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effecter commands, and Simple programs
Implementation And Robot Economics: RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

G. Reading Lists:

Books

1. M.P.Groover, "Industrial Robotics – Technology, Programming and Applications", McGraw-Hill, 2001

2. Fu.K.S. Gonzalz.R.C., and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw-Hill Book Co., 1987
3. Yoram Koren, "Robotics for Engineers", McGraw-Hill Book Co., 1992
4. Janakiraman.P.A., "Robotics and Image Processing", Tata McGraw-Hill, 1995
5. Lorenzo Sciavicco, Luigi Villani, "Robotics: Modelling, Planning and Control", Springer, 2009
6. George A. Bekey, "Robotics: State of the Art and Future Challenges", Imperial College Press, 2008
7. R K Mittal, I J Nagrath, "Robotics and Control 1 Edition", Tata McGraw - Hill Education (2003)
8. S K Saha, "Introduction to Robotics 1st Edition", Tata McGraw - Hill Education (2008)
9. Appin Knowledge Solutions, "Robotics", Jones & Bartlett Learning, 2010
10. Oliver Brock, Jeffrey C. Trinkle, Fabio Ramos, "Robotics: Science and Systems IV", MIT Press, 2009

Magazines:

1. *Robot Magazine, Maplegate Media, 42 Old Ridgebury Road, Danbury, CT 06810*

Journals:

1. *Robotics and Autonomous Systems, Elsiver, Netherlands*
2. *International Journal of Advanced Robotic Systems, Open Access .*
3. *International journals of robotics research publisher, Sage Publications, United State*

Name of the Module: Data Mining & Warehousing
Module Code: CSE-704A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. understand classical models and algorithms in data warehousing and data mining,
2. enable students to analyse the data, identify the problems, and choose the relevant models and algorithms to apply,
3. assess the strengths and weaknesses of various methods and algorithms and to analyse their behaviour.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. **l**earn implementation of classical algorithms in data mining and data warehousing,
2. learn to identify the application area of algorithms, and apply them,
3. learn clustering application and resent works in data mining.

C. Subject matter:

Unit I:

Data Warehousing: Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support –Data Extraction, Cleanup, and Transformation Tools –Metadata.

Unit II:

Business Analysis: Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need –Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

Unit III:

Data Mining: Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives –Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

Unit IV:

Association Rule Mining and Classification: Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction

Unit V:

Clustering and Applications and Trends in Data Mining: Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – Kmeans – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading lists:

Books

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", TataMcGraw – Hill Edition, Tenth Reprint 2007.

2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", SecondEdition, Elsevier, 2007.

3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining",Person Education, 2007.

4. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.

5. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

6. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

7. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2003.

8. M. Golfarelli, S. Rizzi, "Data Warehouse Design: Modern Principles and Methodologies", McGraw-Hill, 2009.

9. Arun K Pujari, "Data Mining Techniques", Second Edition, University Press.

Magazines:

Journals:

1. *Knowledge and Data Engineering, IEEE Transactions, ISSN: 1041-4347*
2. *Data Mining and Knowledge Discovery, Springer, ISSN: 1384-5810 (Print) 1573-756X (Online)*
3. International Journal of Data Mining, Modelling and Management, ISSN online: 1759-1171, ISSN print: 1759-1163

Name of the Module: Data Compression
Module Code: CSE-705A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. introduce the fundamentals concepts of Data Compression,
2. equip students with the knowledge and skills of coding Theory,
3. explore the different paradigms of image and data compression.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. learn Lossy, Lossless compression.
2. learn Transformation for compression like DCT, DFT, vector transformation.
3. learn JPEG compression techniques.
4. learn Video, audio compression etc.

C. Subject matter:

Unit I:

Introduction: Compression Techniques: Loss less compression, Lossy Compression, Measures of prefonnance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit II:

Huffman coding: The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

Unit III:

Arithmetic Coding: Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The
JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-

Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

Unit IV:

Mathematical Preliminaries for Lossy: Coding Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.
Vector Quantization: Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree Structured Vector Quantizers.
Structured Vector Quantizers.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading lists:

Books

1. *Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers*
2. *Ida Mengyi Pu , "Fundamental Data Compression", Butterworth-Heinemann, 2005*
3. *Adam Drozdek, "Elements of Data Compression", Brooks/Cole-Thomson Learning, 2002*
4. *David Salomon, "Variable-length Codes for Data Compression", Springer, 2007*
5. *Khalid Sayood , "Lossless Compression Handbook", Academic Press, 2002*
6. *Source Wikipedia, LLC Books, "Compression Algorithms: Lossless Compression Algorithms, Lossy Compression Algorithms, Huffman Coding, Lossless Data Compression, Jpeg", General Books, 2010*
7. *Kamisetty Ramam Rao, Pat Yip , "The Transform and Data Compression Handbook", CRC Press, 2010*
8. *S Sharma, "Fundamentals of Data Compression", S K Kataria and Sons.*
9. *Peter D. Symes, "Video compression: fundamental compression techniques and an overview of the JPEG and MPEG compression systems", McGraw-Hill, 1998*

Magazines:

Journals:

Name of the Module: Real-time systems
Module Code: CSE 706A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To characterize the problem space real-time systems address and what are the specialized requirements of real-time systems

2. To describe the solutions for standard problems of real-time systems
3. To characterize the solution space real-time systems employ and how these solutions tend to differ from other systems
4. To describe and justify adaptations to the development process to support real-time systems
5. To understand the evaluation of real time systems

B. Learning outcomes:

Students successfully completing this module will be able to:

1. possess knowledge and skill in embedded systems,
2. demonstrate embedded system applications,
3. possess research skills, analytical skills and problem solving skills,
4. recognition of the need for and an ability to engage in lifelong learning and development.

C. Subject matter:

Unit I:

Introduction: Issues in Real Time Computing, Structure of a Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms, UniProcessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.

Unit II:

Programming Languages And Tools: Programming Language and Tools – Desired Language characteristics, Data Typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run-time (Exception) Error handling, Overloading and Generics, Multitasking, Low Level programming, Task scheduling, Timing Specifications, Programming Environments, Run-time Support.

Unit III:

Real Time Databases: Real time Databases - Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.

Unit IV:

Communication: Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.

Evaluation Techniques: Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization - Clock, A Nonfault-Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading lists:

Books

1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw-Hill International Editions, 1997.

2. *Stuart Bennett, "Real Time Computer Control-An Introduction",Second edition, Prentice Hall PTR, 1994.*
3. *Peter D. Lawrence, "Real time Micro Computer System Design – An Introduction", McGraw Hill, 1988.*
4. *S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan,II Edition, 1987.*
5. *R.J.A Buhur, D.L. Bailey, " An Introduction to Real-Time Systems", Prentice-Hall International, 1999.*
6. *Philip.A.Laplante "Real Time System Design and Analysis" PHI , III Edition, April 2004*
7. *Jane W. S. Liu, "Real-Time Systems", Prentice Hall, 2000*
8. *Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2009*
9. *Rob Williams, "Real-Time Systems Development", Butterworth-Heinemann, 2005*
10. *Iyer & Gupta, "Embedded Realtime Systems Programming", Tata McGraw-Hill Education, 2003*

Magazines:

Journals:

1. *International Journal of Embedded and Real-Time Communication Systems (IJERTCS), IGI Global, ISSN: 1947-3176*
2. *Journal of System Architecture, Elsevier, ISSN: 1383-7621.*

Name of the Module: Software Project Management
Module Code: CSE 707A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. deliver successful software projects that support organization's strategic goals,
2. match organizational needs to the most effective software development model,
3. plan and manage projects at each stage of the software development life cycle (SDLC),
4. create project plans that address real-world management challenges,
5. develop the skills for tracking and controlling software deliverables.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand various aspects of project management,
2. work in software project management projects,
3. understand requirements of a project plan,
4. group of tasks performed in a definable time period in order to meet a specific set of objectives.

C. Subject matter:

Unit I:

Fundamentals: Conventional Software Management – Evolution of Software Economics – Improving Software Economics – Conventional versus Modern Software Project Management.

Unit II:

Software Management Process Framework: Lifecycle Phases – Artifacts of the Process – Model Based Software Architectures – Workflows of the Process – Checkpoints of the Process.

Unit III:

Software Management Disciplines: Iterative Process Planning – Organization and Responsibilities – Process Automation – Process Control and Process Instrumentation – Tailoring the Process.

Unit IV:

Managed And Optimized Process: Data Gathering and Analysis – Principles of Data Gathering – Data Gathering Process – Software Measures – Data Analysis – Managing Software Quality – Defect Prevention. Case Studies: COCOMO Cost Estimation Model – Change Metrics – CCPDS–R.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. Walker Royce "Software Project Management A Unified Framework", Pearson Education,2004
2. Humphrey Watts, "Managing the software process", Addison Wesley, 1989. (Unit IV)
3. Ramesh Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
4. Bob Hughes, Mikecotterell, "Software Project Management", 3rd Edition, Tata McGraw Hill, 2004.
5. Ashfaque Ahmed,"Software Project Management", CRC Press, 2012
6. Robert K. Wysocki, "Effective Software Project Management", John Wiley & Sons, 2010
7. Andrew Stellman, Jennifer Greene , "Applied Software Project Management", O'Reilly Media, 2008
8. Robert T. Futrell, Donald F. Shafer, Linda Shafer , "Quality Software Project Management", Prentice Hall Professional, 2002
9. Robert Bruce Kelsey, "Software Project Management: Measures for Improving Performance", Management Concepts, 2006
10. S. A. KELKAR, "SOFTWARE PROJECT MANAGEMENT: A CONCISE STUDY", PHI Learning Pvt. Ltd., 2012

Magazines:

1. Software Developers, Poland

Journals:

1. International Journal of Project Management, Elsevier
2. Journal of Software Project Management and Quality Assurance, International Science Press

Name of the Module: Software Quality Engineering
Module Code: CSE 708A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. Software Quality matrices and their types.
2. Software Quality Assurance
3. Software Verification, Validation, testing and different tools.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. know Quality standards and Software quality assurance
2. know the origins and rationale behind the ISO 9000 standards.
3. know Quality matrices and internal & external attributes.
4. know CMM, ISO certification and its requirements for assurance.

C. Subject matter:

Unit I:

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

Unit II:

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

Unit III:

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

Unit IV:

Software Verification, Validation & Testing: Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.

F. Reading Lists :

Books

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

3. *Linda Westfall, "The Certified Software Quality Engineer Handbook", ASQ Quality Press, 2008*
4. *Raghav Nandyal, "Making Sense of Software Quality Assurance", Tata McGraw-Hill Education, 2007*
5. *Murali Chemuturi, "Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers", J. Ross Publishing, 2010*
6. *Roel Wieringa, Anne Persson, "Requirements Engineering: Foundation for Software Quality: 16th International Working Conference, REFSQ 2010, Essen, Germany, June 30-July 2, 2010. Proceedings", Springer, 2010*
7. *Gerard O'Regan, "Mathematical Approaches to Software Quality", Springer, 2006*
8. *R. a. Khan, K. Mustafa, S. i. Ahson, "Software Quality: Concepts and Practices", Alpha Science, 2006*
9. *Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Pearson/Addison Wesley, 2004*

Magazines:

Journals:

1. *International Journal of Quality & Reliability Management, ISSN: 0265-671X.*
2. *Software Quality Journal, Springer, ISSN: 0963-9314 (print version), ISSN: 1573-1367 (electronic version).*

Name of the Module: Neural Networks
Module Code: CSE 709A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. understand and explain strengths and weaknesses of the neural-network algorithms
2. determine under which circumstances neural networks are useful in real applications
3. distinguish between supervised and unsupervised learning and explain the key principles of the corresponding algorithms

B. Learning outcomes:

Students successfully completing this module will be able to:

1. understand neural network(NN) paradigms
2. learn fuzzy logic
3. have a knowledge of evolutionary computations, genetic algorithm(GA), evolutionary programming, classifier systems, genetic programming parse trees, mathematical foundation of GA variants of GA
4. efficiently and reliably implement the artificial algorithm and engineering problems,
5. describe principles of more general optimisation algorithms.

C. Subject matter:

Unit I:

Basic concepts of neuro computing: Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing

devices. Encoding (training phase) and decoding (active phase).Taxonomy of neural networks: feedforward and recurrent networkswith supervised and unsupervised learning laws. Static and dynamic processing systems. Basic data structures: mapping of vectorspaces, clusters, principal components. **Basic terminology related to an artificial neuron:** a summing dendrite, synapses and their weights, pre and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions.

Unit II:

The Perceptron: The Perceptron and its learning law. Classification of linearly separable patterns **Linear Networks:** Adaline - the adaptive linear element. Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.

Unit III:

Multi-Layer Feedforward Neural Networks: aka Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.
Self-Organising systems: Unsupervised Learning. Local learning laws. Generalised Hebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis --- Karhunen-Loeve transform.

Unit IV:

Competitive Learning: MinNet and MaxNet networks. Clustering. Learning Vector Quantisation. Codebooks. Application in data compression.
Self-Organising Feature Maps Kohonen networks. Radial-Basis function networks
Radial-Basis function (RBF) networks and their application in function interpolation, approximation and modelling probability distributions. Recurrent networks Hopfield networks.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books

1. *Mathukumalli Vidyasagar," Learning and Generalization: With Applications to Neural Networks", Springer*
2. *B. Yegnanarayana, "Artificial Neural Networks", Prentice Hall of India*
3. *Helge Malmgren, Magnus Borga, "Artificial Neural Networks in Medicine and Biology: ", Springer*
4. *Daoliang Li, Yande Liu, Yingyi Chen, "Computer and Computing Technologies in Agriculture IV", Springer*
5. *Raj Kumar Bansal, Ashok Goel, Manoj Kumar Sharma "MATLAB and Its Applications in Engineering", Pearson Education India*
6. *Jun Li Jim Wang, "Advances in Neural Networks-isnn 2006 ", Springer, 2006*
7. *S.N.Sivanandam & S.N.Deepa, "Principles Of Soft Computing ", John Wiley & Sons, 2007*
8. *Callan Robert, "The Essence of Neural Networks", Pearson Education India*
9. *Turban, "Decision Support And Business Intelligence Systems", Pearson Education India, 2008*

10. *James D. Malley, Karen G. Malley, Sinisa Pajevic, "Statistical Learning for Biomedical Data", Cambridge University Press, 2011*

Magazines:

Journals:

1. *Neural Networks, Journal, Elsevier, Netherland, ISSN: 0925-2312*
2. *Neural Computing and Applications, Srpinger, ISSN: 0941-0643 (print version), ISSN: 1433-3058 (electronic version)*
3. *International Journal of Neural Networks and Applications, Serials publication, India*

Name of the Module: Fuzzy Systems
Module Code: CSE 710A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to provide a general introduction fuzzy system
2. to provide the fundamentals of fuzzy application
3. to explain advanced of fuzzy expert system

B. Learning outcomes:

Students successfully completing this module will be able to:

1. represents the extending and improvement of the artificial intelligence knowledge with special focus on analysis and development of knowledge systems using the fuzzy mathematic and fuzzy logic principles and approaches.
2. students will be ready for design, development and practical appication of fuzzy oriented expert systems and fuzzy controllers.

C. Subject matter:

Unit I:

Introduction to fuzzy sets: and systems-crispness, vagueness, uncertainty and fuzziness. Basics of fuzzy sets, membership functions, support of a fuzzy set height, normalized fuzzy set, α cuts.

Unit II:

Properties of Fuzzy set: Operation on fuzzy set-complement, intersection, union, equality & subsethood. Law of excluded middle, law of contradiction, concentration, dialation, contrast intensification.Type- 2 fuzzy sets.

Unit III:

Extension Principle and its application: Fuzzy relation, operations on fuzzy relation, projection, max-mini composition, cylindrical extension.Reflexivity,symmetry and transcitivity.Fuzzy prepositions,fuzzy connectives, linguistic variables, linguistic hedges, Fuzzy quantifiers. Approximate reasoning orfuzzy inference, generalized modus ponens (GMP), generalized modus Tollens (GMT) Fuzzy rulebased system. Fuzzification and defuzzifiction,centroid,centre of sums.

Unit IV:

Applications-Fuzzy logic controllers: Types of FLC- Types of Fuzzy rule formats. Block diagram of fuzzy logic controller.multi input multi output control system. Fuzzy control of a cement kiln, Automatic train operating system, Fuzzy pattern recognition. Inverted pendulum, aircraft landingcontrol, air conditioner control.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. *Timothy J. Ross, Fuzzy Logic with Engineering Applications , 2/e, McGraw Hill*
2. *Zimmerman, H.J.,Fuzzy Set Theory and its Applications 4/e,Springer.2001.*
3. *Ganesh, M., Introduction to Fuzzy Sets and Fuzzy Logic, PHI,2006.*
4. *Driankov, D., Hellendoorn, H., Reinfrank, M., "An Introduction to Fuzzy Control" , Narosa,1996*
5. *Nikola K. Kasabov, "Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering", MIT.*
6. *Ahmad M. Ibrahim, "Fuzzy Logic for Embedded Systems Applications", Elsevier*
7. *Lotfi Asker Zadeh, "Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems: Selected Papers", World Scientific*
8. *Elie Sanchez, Takanori Shibata, Lotfi Asker Zadeh, "Genetic Algorithms and Fuzzy Logic Systems: Soft Computing Perspectives", World Scientific*
9. *James J. Buckley, "Simulating Fuzzy Systems", Springer*
10. *Zhenyuan Wang, George J. Klir, "Fuzzy Measure Theory", Springer*

Magazines:

Journals:

1. *Journal of Intelligent & Fuzzy Systems, IOS Press, Amsterdam*
2. *International Journal of Fuzzy System Applications (IJFSA) - IGI Global, IJFSA, Taiwan*
3. *Fuzzy Sets and Systems - Journal - Elsevier, Netherland*

Name of the Module: Parallel Algorithms I
Module Code: CSE 711A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. To acquaint students with the basic concepts of parallel and distributed computing.

2. The course aims to the general principles of parallel and distributed algorithms and their time complexity.
3. to Study different aspects of Parallel Models
4. to Study different aspects of Interconnection Architecture
5. analyse fundamental parallel algorithms from various application domains.

B. Learning outcomes:

Students successfully completing this module will be able to:

1. design, implementation and evaluate parallel algorithms and in the field of HPC (High Performance Computing) in general.
2. understand the role of computation models in parallel computation,
3. understand the circuit and comparison network models,
4. understand the basics of merging and sorting networks.

C. Subject matter:

Unit I:

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

Unit II:

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

Unit III:

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, Parallel Sorting Networks on CREW/EREW/MCC/, linear array

Unit IV:

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding. Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms- Permutation, Combinations, Derrangements

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. *M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer", Mc GrawHill.*
2. *R. Greenlaw, H.J. Hoover, W.L. Ruzzo, Limits to Parallel Computation: P-Completeness Theory, Oxford University Press, New York, 1995.*
3. *V. Kumar, A. Grama, A. Gupta, G. Karypis, "Introduction to Parallel Computing", The Benjamin/Cummings Publishing Company, Redwood City, California, 1994.*
4. *T. Cormen, C. Leiserson, R. Rivest, "Introduction to Algorithms", The MIT Press, Cambridge, 1992.*

5. *S. G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice Hall, 1989.*
6. *M. J. Quinn, "Parallel Computing", McGraw Hill, 1994.*
7. *F.T. Leighton, "Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes", Morgan Kaufmann Publishers, San Mateo, California, 1992.*
8. *D.P. Bovet, P. Crescenzi, "Introduction to The Theory of Complexity", Prentice Hall, N.Y., 1994.*
9. *Selim G. Akl, "Parallel Sorting Algorithms", Academic Press, 2014, ISBN: 148326808X, 9781483268088*

Magazines:

Journals:

1. *International Journal of Parallel Programming, Springer, United State, ISSN: 0885-7458 (Print) 1573-7640 (Online)*
2. *Journal of Parallel and Distributed Computing, Elsevier, Neitherland*
3. *Parallel Computing: Systems and Applications, Elsevier, ISSN: 0167-8191*

Name of the Module: Real Time Operating Systems
Module Code: CSE 712A
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. participant with basics of real-time operating systems
2. give the participant knowledge and skills necessary to develop software for embedded computer systems using a real-time operating system.

B. Learning outcomes:

Students successfully completing this nodule will be able to:

1. evaluate the nature of real-time systems in appropriate terminology .
2. critically evaluate the real-time characteristics of a system to assist in deciding which software or kernel is appropriate for a problem.
3. interpret and compare the design of a real-time system in a range of formats.
4. evaluate advanced real-time system areas, including scheduling and distributed.
5. formulate judgements and synthesise conclusions following completion of research into a real-time system topic.

C. Subject matter:

Unit I:

Introduction to Operating System: Computer Hardware Organization, BIOS and Boot Process, Multi-threading concepts, Processes,
Threads, Scheduling.

Basics of real-time concepts: Terminology: RTOS concepts and definitions, real-time design issues, examples, Hardware Considerations: logic states, CPU, memory, I/O, Architectures, RTOS building blocks, Real-Time Kernel

Unit II:

Process Management: Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria, scheduling algorithms
Threads: Multi-threading models, threading issues, thread libraries

Unit III:

Mutex: creating, deleting, prioritizing mutex, mutex internals
Inter-process communication: buffers, mailboxes, queues, semaphores, deadlock, priority inversion, Pipes

Unit IV:

Memory Management: process stack management, run-time buffer size, swapping, overlays, block/page management, replacement algorithms, real-time garbage collection
Kernel Design Issues: structure, process states, data structures, inter-task communication mechanism, Linux Scheduling

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. *Hermann Kopetz, "Real-Time Systems: Design Principles for Distributed Embedded Applications", Springer Science & Business Media, 2011, ISBN: 144198237X, 9781441982377*
2. *Philips A. Laplante, "Real-Time System Design and Analysis", John Wiley & Sons, 2004, ISBN: 0471648280, 9780471648284*
3. *Doug Abbott , "Linux for Embedded and Real-Time Applications", Newnes, 2012, ISBN: 0123914337, 9780123914330*
4. *Albert M. K. Cheng, "Real-Time Systems: Scheduling, Analysis, and Verification", John Wiley & Sons, 2003, ISBN: 0471460842, 9780471460848*
5. *Francis Cottet, Joëlle Delacroix, Claude Kaiser, Zoubir Mammeri, "Scheduling in Real-Time Systems", John Wiley & Sons, 2002, ISBN: 0470847662, 9780470847664.*
6. *Joseph, M, "Real-Time Systems Specification, Verification and Analysis. Prentice Hall", 1996, ISBN 0-13-455297-0.*
7. *Krishna, C. M., Shin, K. G., "Real-Time Systems", McGraw-Hill, 1997, ISBN 0-07-114243-6.*
8. *Labrosse, J. J., "MicroC OS II: The Real Time Kernel", Newnes, 2nd ed., 2002, ISBN 978-1578201037.*

Magazine:

Journals:

1. *Real-Time Systems, Springer, United State, ISSN: 0922-6443 (Print) 1573-1383 (Online)*
2. *TOCS - ACM Transactions on Computer Systems, ACM, United State, ISSN:0734-2071*

ELECTIVE -II

Name of the Module: Information Coding Techniques
Module Code: CSE 705B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. basics and introduction of error–control coding,
2. understand encoding and decoding of digital data streams,
3. introduce methods for the generation of these codes and their decoding techniques.
4. knowledge of compression and decompression techniques,
5. introduce the concepts of multimedia communication,
6. study audio, video, text coding and compression,

B. Learning outcomes:

Students successfully completing this module will be able to:

1. apply the basics of information theory to calculate channel capacity and other measures,
2. design specific data compression techniques and calculate the compression achieved,
3. apply and control specific coding methods and be able to calculate the rate and error probabilities achieved,
4. understand the basic concepts and complexity of cryptographic security methods and their practical applications.

C. Subject matter:

Unit I:

Information Entropy Fundamentals: Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding –Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.

Unit II:

Data and Voice Coding: Differential Pulse code Modulation – Adaptive Differential Pulse Code Modulation – Adaptive subband coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates (Vocoders, LPC).

Unit III:

Error Control Coding: Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes.

Unit IV:

Compression Techniques: Principles – Text compression – Static Huffman Coding – Dynamic Huffman coding – Arithmetic coding – Image Compression – Graphics Interchange format – Tagged Image File Format – Digitized documents – Introduction to JPEG standards.

Audio And Video Coding: Linear Predictive coding – code excited LPC – Perceptual coding, MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG Video standards.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%

Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books

1. *Mark Nelson, "Data Compression Book", BPB Publication 1992.*
2. *Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995.*
3. *J.S.Chitode, "Information Coding Technique", Technical Publication*
4. *Gareth Aneurin Jones, Josephine Mary Jone, "Information Coding Theory", Springer*
5. *R. J. McEliece, "The Theory of Information and Coding: Student Edition", Cambridge University Press, 2004, ISBN: 0521831857, 9780521831857*
6. *J.S.Chitode, "Information Theory and Coding ", Technical Publication*
7. *Bose, "Information Theory, Coding and Cryptography", Mc Graw Hill*
8. *Kees A. Schouhamer Immink, "Coding techniques for digital recorders", Prentice Hall, 1991*
9. *Isaac Woungang, Sudip Misra, Subhas Chandra Misra, "Selected Topics in Information and Coding Theory" , World Scientific, 2010*
10. *Simon Haykin, "Communication Systems", John Wiley and Sons, 4th Edition, 2001.*
11. *Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002;*

Magazines:

Journals:

1. *International Journal of Information and Coding Theory, Inderscience, Switzerland, ISSN online: 1753-7711, ISSN print: 1753-7703*
2. *IEEE Transactions on Information Theory, IEEE, United State, ISSN: 00189448*
3. *Introduction to Coding and Information Theory,Springer, ISBN 978-0-387-94704-4*
4. *Channel Coding: Theory, Algorithms, and Applications, ISBN: 9780123964991 (Print), 9780123972231 (online).*

Name of the Module: Pattern Recognition & Image Processing
Module Code: CSE 706B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. introduction of pattern recognition System and its research fields,
2. introduce methods in image processing,
3. understand different clustering techniques and general understanding of the fundamentals of digital image processing,

4. introduce the student to analytical tools which are currently used in digital image processing as applied to image information for human viewing,
5. develop the students ability to apply these tools in the laboratory in image restoration, enhancement and compression,
6. understand differences between computer vision and image processing,
7. know the basic components of an image processing system.

B. Learning outcomes:

Students who successfully complete this module will be able to:

1. understand the basics of the human visual system as they relate to image processing; including spatial frequency resolution and brightness adaption,
2. understand how images are represented; including optical images, analog images, and digital images,
3. Understand image types such as binary images, gray-scale images, color and multi-spectral images,
4. know the key concepts in image file formats,
5. understand the model for an image analysis process,
6. understand why preprocessing is performed and know about image geometry, convolution masks, image algebra and basic spatial filters,
7. understand image quantization in both the spatial and brightness domains,
8. know about the 2-D Fourier, discrete cosine, Walsh-Hadamard and wavelet transforms; including implied symmetry, phase, circular convolution, vector inner and outer products and filtering,
9. know why log remapping is necessary for viewing spectral image data,
10. understand lowpass, highpass, bandpass, notch filters; including ideal and non-ideal filters such as the Butterworth.

C. Subject matter:

Unit I:

Basic Concepts: Pattern Recognition Systems, Fundamental Problems in pattern recognition system design, Design concepts and Methodologies, Character recognition, Speech recognition, Finger print Recognition " Pattern Recognition Model.

Decision Functions: Linear Decision functions Distance functions. Minimum distance classification, clustering concepts, Cluster seeking algorithms, Maximum distance, K- means Algorithms.

Unit II:

Bayes classified: decision function For Bayes classifier Bayes Classifier for normal patterns. Trainable pattern classifiers deterministic approach, perception approach reward punishment concept.

Gradient approach: Gradient Descent algorithms LMSE Algorithms Multi category classification.

Unit III:

Trainable pattern classifiers: statistical approach stochastic approximation methods, Robbin Minro algorithms increment correction algorithms, LMSE algorithms. Syntactic patter recognition formulation syntax directed recognition picture descript.

Digital Image fundamentals: Representation, elements image transforms Fast Fourier transform, DCT and DWT.

Unit IV:

Image enhancement: Spatial domain - frequency domain methods Histogram, Modification techniques Image Smoothing, image sharpening.

Image encoding: Fidelity criteria, Encoding process, Mapping Quantizer coder Image Segmentation Masks Point detection Line Detection Edge Detection.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%

Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books

1. Digital Image Processing by R.C. Gonzalez & R.E. Woods, Addison Wesley.
2. Pattern Recognition Principles J.T.TOU.R.C. Gonzalez, Addison Wesley.
3. Fundamentals of Digital Image Processing by A.K. Jain, PHI Pearson Education
4. Daisheng Luo, "Pattern Recognition and Image Processing", Horwood, 1998
5. Cornelius T. Leondes, "Image Processing and Pattern Recognition", Elsevier
6. Frank Y. Shih," Image Processing and Pattern Recognition: Fundamentals and Techniques", John Wiley & Sons
7. James C. Bezdek, James Keller, Raghu Krisnapuram, Nikhil R. Pal," Fuzzy Models and Algorithms for Pattern Recognition and Image Processing", Springer
8. Ashish Ghosh, Sankar K. Pal, "Soft Computing Approach to Pattern Recognition and Image Processing", World Scientific Publishing Co. Pte. Ltd.
9. Jun Shen, Patrick Shen-pei Wang, Tianxu Zhang, "Multispectral Image Processing and Pattern Recognition", World Scientific Publishing Co. Pte. Ltd.
10. Tzay Y. Young, "Handbook of pattern recognition and image processing", Academic Press, 1994.

A. Magazine:

1. *Pattern recognition, Elsevier, Neitherland*

B. Journals:

1. *IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE, United State*
2. *International Journal of Computer Vision, Springer, Neitherland*
3. *Pattern Recognition and Image Analysis, Springer, Neitherland*

Name of the Module: Embedded System Design
Module Code: CSE 707B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. Introduce to features that build an embedded system.
2. To help the understanding of the interaction that the various components within an embedded system have with each other.
3. Techniques of inter facing between processors & peripheral device related to embedded processing.
4. To enable writing of efficient programs on any dedicated processor.

5. To present in lucid manner the basic concepts of systems programming like operating system, assembler compliers etc and to understand the management task needed for developing embedded system.

B. Learning outcomes:

Students successfully completing this module will be able:

1. to know about Embedded systems and the interface issues related to it,
2. to know about different techniques on embedded systems,
3. to know about the real time models, languages and operating systems,
4. to analyze real time examples, obstacles and solutions.

C. Subject matter:

Unit I:

Introduction to Embedded System: Introduction to functional building blocks of embedded systems – Register, memory devices, ports, timer, interrupt controllers using circuit block diagram representation for each categories.

Unit II:

Processor And Memory Organization: Structural units in a processor; selection of processor & memory devices; shared memory; DMA; interfacing processor, memory and I/O units; memory management – Cache mapping techniques, dynamic allocation - Fragmentation.

Unit III:

Devices & Buses For Devices Network: I/O devices; timer & counting devices; serial communication using I2C, CAN, USB buses; parallel communication using ISA, PCI, PCI/X buses, arm bus; interfacing with devices/ports, device drivers in a system – Serial port & parallel port.

I/O Programming Schedule Mechanism: Intel I/O instruction – Transfer rate, latency; interrupt driven I/O - Non-maskable interrupts; software interrupts,
writing interrupt service routine in C & assembly languages; preventing interrupt overrun; disability interrupts. Multi threaded programming – Context switching, premature & non-premature multitasking, semaphores. Scheduling – Thread states, pending threads, context switching, round robin scheduling, priority based scheduling,
assigning priorities, deadlock, watch dog timers.

Unit IV:

Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS – Interrupt handling, task scheduling; embedded system design issues in system development process – Action plan, use of target system, emulator, use of software tools.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. Rajkamal, 'Embedded System – Architecture, Programming, Design', Tata McGraw Hill, 2003.
2. Daniel W. Lewis 'Fundamentals of Embedded Software', Prentice Hall of India, 2004.
3. David E. Simon, 'An Embedded Software Primer', Pearson Education, 2004.

4. Frank Vahid, 'Embedded System Design – A Unified hardware & Software Introduction', John Wiley, 2002.
5. Sriram V. Iyer, Pankaj Gupte, 'Embedded Real Time Systems Programming', Tata McGraw Hill, 2004.
6. Steve Heath, 'Embedded System Design', II edition, Elsevier, 2003.
7. Peter Marwel, "Embedded System Design", Springer
8. Jack Ganssle, "Embedded Sysem ",newnes
9. Elecia White, "Making Embedded System", O' Reilly
10. A.P. Godse, "Embedded System", Technical Publication

Magazines:

1. *The IEEE Embedded Systems Letters (Esl), IEEE, United State*

Journals:

1. *International Journal of Embedded Systems - Inderscience, Switzerland*
2. *EURASIP Journal on Embedded Systems - Springer, United State*
3. *Journal of Systems Architecture - Elsevier, Neitherland*

Name of the Module: Digital audio & speech Process
Module Code: CSE 708B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to Study different aspects of the speech communication process,
2. to Study different aspects of principles of discrete-time processing of speech and music.

B. Learning outcomes:

Students who successfully complete this module will be able to:

1. implement algorithms for processing audio and speech signals,
2. take into account the properties of acoustic signals and human hearing in the design of audio signal processing systems,
3. understands the speech production apparatus and its models,
4. estimate the effect of the signal representations on sound quality.

C. Subject matter:

Unit I:

Audio Processing: Auditory perception and psychoacoustics - Masking, frequency and loudness perception, spatial perception, Digital Audio, Audio Coding - High quality, low-bit-rate audio coding standards, MPEG, AC-3, Multichannel audio - Stereo, 3D binaural and Multichannel surround sound.
Digital Models for The Speech Signal: Process of speech production, Acoustic theory of speech production, Lossless tube models, and Digital models for speech signals.

Unit II:

Time Domain Models For Speech Processing: Time dependent processing of speech, Short time energy and average magnitude, Short time average zero crossing rate, Speech vs silence discrimination

using energy & zero crossings, Pitch period estimation, Short time autocorrelation function, Short time average magnitude difference function, Pitch period estimation using autocorrelation function, Median smoothing. Digital Representations of The Speech Waveform: Sampling speech signals, Instantaneous quantization, Adaptive quantization, Differential quantization, Delta Modulation, Differential PCM, Comparison of systems, direct digital code conversion.

Unit III:

Short Time Fourier Analysis: Linear Filtering interpretation, Filter bank summation method, Overlap addition method, Design of digital filter banks, Implementation using FFT, Spectrographic displays, Pitch detection,Analysis by synthesis, Analysis synthesis systems.

Homomorphic Speech Processing: Homomorphic systems for convolution, Complex cepstrum, Pitch detection, Formant estimation, Homomorphic vocoder.

Linear Predictive Coding Of Speech: Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications.

Unit IV:

Speech Enhancement: Spectral subtraction & filtering, Harmonic filtering, parametric resynthesis, Adaptive noise cancellation.

Speech Synthesis: Principles of speech synthesis, Synthesizer methods, Synthesis of intonation, Speech synthesis for different speakers, Speech synthesis in other languages, Evaluation, Practical speech synthesis.

Automatic Speech Recognition: Introduction, Speech recognition vs. Speaker recognition, Signal processing and analysis methods, Pattern comparison techniques, Hidden Markov Models, Artificial Neural Networks.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. L. R. Rabiner and R. W. Schafer, "Digital Processing of Speech Signals," Pearson Education (Asia) Pte. Ltd., 2004.
2. D. O'Shaughnessy, "Speech Communications: Human and Machine," Universities Press, 2001.
3. L. R. Rabiner and B. Juang, "Fundamentals of Speech Recognition," Pearson Education (Asia) Pte. Ltd., 2004.
4. Z. Li and M.S. Drew, "Fundamentals of Multimedia," Pearson Education (Asia)
5. Vijay Madisetti, " The Digital Signal Processing Handbook", CRC Press
6. Hector Perez-Meana, " Advance in audio and Speech Signal Pracessing Technologies and appliction " Idea group inc.
7. Ben Gold, Nelson Morgan, Dan Ellis, "Speech and Audio Signal Processing", Wiley
8. Mark Kahrs, Karlheinz Brandenburg, "Application of digital signal processing to audio and acoustic", Springer
9. Rabiner, " Digital Processing of Speech signal", Pearson

10. *Saeed V. Vaseghi, " Multimedia Signal Processing : Theory and application in speech , Music and Communication", Wiley*

Magazines:

1. *IEEE Signal processing magazine, IEEE, United State*

Journals:

1. *IEEE transaction on Audio, Speech and language processing, IEEE, United State*
2. *ACM Transactions on Speech and Language Processing, ACM, United State*
3. *EURASIP Journal on Audio, Speech, and Music Processing, Springer, United State*

Name of the Module: Parallel Algorithms II
Module Code: CSE 711B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to Study different aspects of Parallel Models
2. to Study different aspects of Interconnection Architecture
3. analyse a number of fundamental parallel algorithms from various application domains.

B. Learning outcomes:

Upon successful completion of the module students should be able to:

5. understand the role of computation models in parallel computation,
6. understand the circuit and comparison network models,
7. understand the basics of merging and sorting networks.

C. Subject matter:

Unit I:

Parallel Models (SIMD, MIMD, PRAMs, Interconnection Networks); Performance Measures (Time, Processors, Space, Work);

Unit II:

Interconnection Architectures (Linear Array, Meshes, Trees, Mesh of Trees, Hypercubes, Butterfly Networks,Cube Connected Cycles, Benes Networks);

Unit III:

Techniques (Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Pipelining, Systolic Computation, Acccelerated Cascading, Prefix Computation, List Ranking, Euler Tour, Tree Contraction);

Unit IV:

Sorting, Searching, Merging; Matrix Operations; Graph Algorithms (Connected Components, Spanning Trees, Shortest Paths); Complexity (Lower bounds, NC Class and P-Completeness).

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%

Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books

1. *R. Greenlaw, H.J. Hoover, W.L. Ruzzo, "Limits to Parallel Computation: P-Completeness Theory", Oxford University Press, New York, 1995.*
2. *V. Kumar, A. Grama, A. Gupta, G. Karypis, "ntroduction to Parallel Computing", The Benjamin/Cummings Publishing Company, Redwood City, California, 1994.*
3. *T. Cormen, C. Leiserson, R. Rivest, "Introduction to Algorithms", The MIT Press, Cambridge, 1992.*
4. *S. G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice Hall, 1989.*
5. *M. J. Quinn, "Parallel Computing", McGraw Hill, 1994.*
6. *F.T. Leighton, "Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes", Morgan Kaufmann Publishers, San Mateo, California, 1992.*
7. *D.P. Bovet, P. Crescenzi, "Introduction to The Theory of Complexity", Prentice Hall, N.Y., 1994.*
8. *Al Geist, et al., "PVM: Parallel Virtual Machine - a User's Guide and Tutorial for Networked Parallel Computing", The MIT Press, Cambridge, 1994.*
9. *B. Wilkinson, M. Allen. "Parallel Programming – Techniques and Applications Using Networked Workstations and Parallel Computers", Prentice Hall, 1999.*
10. *S. G. Akl, "Parallel Computation – Models and Methods", Prentice Hall, 1997.*
11. *P. S. Pacheco, "Parallel Programming with MPI", Morgan Kaufman, San Francisco, 1997.*

Magazines:

Journals:

1. *International Journal of Parallel Programming, Springer, United State, Print ISSN: 0885-7458, Online ISSN: 1573-7640*
2. *Journal of Parallel and Distributed Computing, Elsevier, Neitherland*

Name of the Module: Computational Complexity
Module Code: CSE 710B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to introduce students to important models of computation and how they are related,
2. fundamental notions of computation such as 'computable' and 'efficiently computable,
3. the design and analysis of efficient algorithms.

B. Learning outcomes:

Upon successful completion of the module students should be able to

1. to have an understanding of different models of computation and their relevance to computer science,
2. to have an understanding of how algorithms can be used to solve fundamental problems within Computer Science.

C. Subject matter:

Unit I:

Resources for computation (time, space, nondeterminism, randomness) and their associated complexity classes.

Relationships among resources (P vs. NP and more) Reductions & completeness,

Unit II:

Provably intractable problems: hierarchy thms, EXPSPACE-completeness

Space complexity: PSPACE, L, NL, Randomized computation: RP, BPP

Unit III:

Alternation: the polynomial hierarchy (PH), time-space tradeoffs for SAT Relativization (why diagonalization can't resolve P vs NP)

Basic circuit complexity (P/poly, NC) Interactive proofs (AM, MA, IP), Probabilistically checkable proofs (PCP) and nonapproximability

Possible topics

Unit IV:

Unique Games Conjecture, Parity not in AC, Average-case complexity, Counting: P, Toda's Thm, approximate counting, Communication complexity and applications, Algebraic complexity: VNP, VP, Permanent vs. Determinant, Quantum computation: BQP, Shor's Factoring algorithm

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. *Sanjeev Arora and Boaz Barak, "Computational Complexity: A Modern Approach", Cambridge University Pres.*
2. *Oded Goldreich, "Computational Complexity: A Conceptual Perspective", Cambridge University Press*
3. *Steven Rudich, Avi Wigderson, "Computational Complexity Theory", American Mathematical Soc., ISBN: 0821886924, 9780821886922*
4. *K. Wagner, G. Wechsung, "Computational Complexity", Springer, 2001*
5. *Ding-Zhu Du, Ker-I Ko, "Theory of Computational Complexity", Wiley*
6. *Juris Hartmanis, "Computational Complexity Theory", American Mathematical Society*
7. *Jin-yi Cai, "Advances in Computational Complexity Theory", American Mathematical Society*
8. *Marius Zimand, "Computational Complexity: A Quantitative Perspective", Elsevier*
9. *Allon Percus, Gabriel Istrate, Cristopher Moore, "Computational Complexity and Statistical Physics", Oxford*

10. C. Calude, "Theories of Computational Complexity", Elsevier, Netherland

Magazines:

Journals:

1. *International Journal of Computational Complexity and Intelligent Algorithms, Inderscience, swithzerland.*
2. *Journal of Complexity, Elsevier, Netherland*

Name of the Module: Natural Language Processing
Module Code: CSE 712B
Semester: 7th
Credit Value: 3[P=0, T=0, L=3]
Module Leader:

A. Objectives:

The course is designed to meet the objectives of:

1. to provide a general introduction including the use of state automata for language processing,
2. to provide the fundamentals of syntax including a basic parse ,
3. to explain advanced feature like feature structures and realistic parsing methodologies,
4. to explain basic concepts of remotes processing,
5. to give details about a typical natural language processing applications.

B. Learning outcomes:

Upon successful completion of the module students should be able:

1. to expose the basic principles of language processing and typical applications of natural language processing systems,
2. to set up and implement language technology experiment step by step,
3. to evaluate language technology components,
4. to familiar with a sample of machine learning techniques and can assess which ones are suitable for a given problem,
5. to interaction between rule based and probabilistic methods in language technology.

C. Subject matter:

Unit I:

Introduction : Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology – Finite-State Morphological parsing – Combining FST lexicon and rules – Lexicon-Free FSTs: The porter stammer – Human morphological processing

Unit II:

Syntax : Word classes and part-of-speech tagging: 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. Context-Free Grammars for English: Constituency – Context-Free rules and trees – Sentence-level constructions – The noun phrase – Coordination – Agreement – The verb phase and sub categorization – Auxiliaries – Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free

grammars – Grammars and human processing. 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.

Unit III:

Advanced Features And Syntax: Features and Unification: Feature structures – Unification of feature structures – Features structures in the grammar – Implementing unification – Parsing with unification constraints – Types and Inheritance. exicalized and Probabilistic Parsing: Probabilistic context-free grammar – problems with PCFGs – Probabilistic lexicalized CFGs – Dependency Grammars – Human parsing.

Unit IV:

Semantic: Representing Meaning: Computational desiderata for representations – Meaning structure of language – First order predicate calculus – Some linguistically relevant concepts – Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis – Attachments for a fragment of English – Integrating semantic analysis into the early parser – Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon.

Applications: Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation – Robust word sense disambiguation – Information retrieval – other information retrieval tasks. Natural Language Generation: Introduction to language generation – Architecture for generation – Surface realization – Discourse planning – Other issues. Machine Translation: Language similarities and differences – The transfer metaphor – The interlingua idea: Using meaning – Direct translation – Using statistical techniques – Usability and system development.

D. Teaching/ Learning/ Practice pattern:

Teaching: 40%
Learning: 10%
Practice: 50%

E. Examination pattern:

1. Theoretical Examination: Regular Examination.
2. Practical Examination: Conducting experiment and viva voice

F. Reading Lists:

Books:

1. *Daniel Jurafsky & James H.Martin, " Speech and Language Processing", Pearson Education (Singapore) Pte. Ltd., 2002.*
2. *James Allen, "Natural Language Understanding", Pearson Education, 2003.*
3. *Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT press*
4. *Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python", O' Reilly*
5. *Ela Kumar, "Natural Language Processing", I. K. International*
6. *Philip M. McCarthy, Chutima Boonthum-Denecke, Chutima Boonthum, "Applied Natural Language Processing and Content Analysis", information science reference*
7. *Nitin Indurkhya, Fred J. Damerau, "Handbook of Natural Language Processing, Second Edition", CRC Press*
8. *Robert Dale, Hermann Moisl, Harold Somers, "Handbook of Natural Language Processing", CRC Press.*

9. *Tanveer Siddiqui, U. S. Tiwary, "Natural Language Processing and Information Retrieval", OUP India, 2008*
10. *Karen Sparck Jones, Julia R. Galliers, "Evaluating Natural Language Processing Systems: An Analysis and Review",* Springer Science & Business Media, 1995, ISBN: 3540613099, 9783540613091
11. *Bernadette Sharp, Rodolfo Delmonte, "Natural Language Processing and Cognitive Science: Proceedings 2014", Walter de Gruyter GmbH & Co KG, 2015, ISBN: 1501501313, 9781501501319*

Magazines:

Journals:

1. *IJCLNLP International Journal of Computational Linguistics and Natural Language Processing, ISSN number 2279 – 0756*
2. *IEEE Transactions on Audio, Speech, and Language Processing, IEEE, United State, ISSN: 1558-7916.*
3. *ACM Transactions on Audio, Speech, and Language Processing, ACM, United State, ISSN:2329-9290*

Eighth Semester

Subject Code	Subject	P	T	L	Credit
XXX – 801	Industrial Training	2	0	0	1
XXX – 802	Project Works	16	0	0	8
XXX – 803	Seminar	2	0	0	1
XXX - 804	Grand Viva	12	0	0	6
		32	**0**	**0**	**16**

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