1901MA102	MATHEMATICS – I(Calculus and Linear Algebra) (CSE, IT)	L	T	P	C
		3	2	0	4

Aim of the course:

1.To familiarize the students with differential calculus.

2.To develop the use of integration techniques that is needed by engineers for practical applications.

3.To familiarize the student with concepts of matrices. This is needed in many branches of engineering.

4.To make the students understand the idea of vector spaces and linear transformations.

5.To acquaint the student appreciate the purpose of using transforms to create a new domain of the matrix.

PREREQUISITES: BASIC MATHEMATICS

Module 1: Differntial Calculus

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature-Evolutes and involutes.

Module 2: Integral Calculus

Double integration – Cartesian and polar coordinates – Change the order of Integration – Applications: Area of a curved surface using double integral – Triple integration in Cartesian co-ordinates – Volume as triple integral.

Module 3: Linear Algebra

Matrices,Vectors: addition and Scalar multiplication, matrix multiplication; Linear systems of equations, linear independence, rank of a matrix, determinants,Cramer's rule, inverse of a matrix,Gauss elimination and Gauss-Jordan methods.

Module 4: Vector Spaces

Vector Space,Linear Independence of Vectors,basis,dimesnsions; Linear Transformations (maps) range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

Module 5: Matrices

System of Linear Equations; Symmetric,Skew-symmetric and orthogonal matrices - Eigen values and Eigen Vectors ; Diagonalization of Matrices - Reduction of a quadratic form to a canonical form by orthogonal transformation .

COURSE OUTCOMES SKILL DEVELOPMENT

After completion of the course, the student will be able to

CO1: Develop the evolutes and envelopes of given curves by means of radius and centre of curvature(K3)

CO2: Determine the area and volume of a curve using double and triple integration

CO3: Calculate the inverse and rank of a square matrix and Make use of Matrix Operations to solve the systems of linear equations

CO4: Determine Vector spaces and subspaces using linear independence and span of a set of vectors, basis and dimension.

CO5: Determine the nature of the matrix using Orthogonal Transformation.

TEXT BOOKS:

REFERENCES (BOOKS):

1.Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2018.

2.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,

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1901CH104	APPLIED CHEMISTRY IN INFORMATICS (for CSE&IT)	L	T	P	C
		3	0	0	3

Aim of the course: Applied Chemistry in informatics course is designed to provide chemistry and its application to the Copmuter science and engineering students. The course is a combination of the theoretical concepts and application of the theoretical concepts of chemistry. It includes the study of applications of cell chemistry, material for computers, nano materials, polymers and chem informatics as well as their theoretical parts. The course is designed very efficiently, specifically to support the computer science programme through chemistry .

PREREQUISITES: BASIC CHEMISTRY

CELL CHEMISTRY

Cell terminology Cell reactions - Conductors, insulators-Daniel cell-Difference between electrolytic cells and electrochemical cells. Reversible cells and irreversible cells -types- EMF and its applications - Nernst equation (derivation).Single electrode potential - Hydrogen electrode - Calomel electrode - Glass electrode - pH measurement using glass electrode.

MODULE II MATERIALS FOR COMPUTERS

Materials for computers and communications - crystalline semiconductors; metalized film conductors; dielectric films; solders; ceramics and polymers. Electronic materials, Semiconductor crystals - Silicon, III–V compounds, Photoresist films, Packaging materials, Photonic materials, Crystalline materials - Epitaxial layers, Optical switching, Optical transmission. NLO and OLED Materials.

MODULE III NANOTECHNOLOGY 9 Hours

Nanotechnology - Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties.Nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, chemical vapour deposition, laser ablation; Properties and applications.

MODULE IV POLYMERS 9 Hours

Introduction: Classification of polymers — Natural and synthetic; Thermoplastic and Thermosetting. Functionality — Degree of polymerization. Addition (Free Radical Mechanism) condensation and copolymerization. Conductive polymers- Fabrication of Plastics. Preparation properties and uses of Nylon66, Teflon, Epoxy resin.

MODULE V CHEMINFORMATICS

Cheminformatics-Definition — types of Bonds - Bond length- Bond angles - Torsional angles - Ramachandran plot for poly peptides with dihedral angles. Coordinates of atom in a molecule - Conformation - Cambridge structural database - Application— Linear format - SMILEYS notation — MOL format. Similarity search — Sub structure search - Structural keys — Finger print —structure based drug design — protein data bank- Application.

Total: 45 Hour

SKILL DEVELOPMENT

COURSE OUTCOMES

After completion of the course, the student will be able to

CO1: **Describe electrode potential concepts using electro chemical principles**
CO2: **Illustrate the semiconductor materials and its importance**
CO3: Classify the nano materials used for different purposes
CO4: Describe the various polymer materials and its formation
CO5: Discuss the different chemoinformtics tools used

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1901GEX03	PROGRAMMING FOR PROBLEM SOLVING (Common for all B.E./B.Tech Programme)	L 3	T 0	P 0	C 3

COURSE OBJECTIVES:

1. To prepare students to comprehend the fundamental concepts
2. To demonstrate fine grained operations in number system
3. To gain exposure in programming language using C
4. To develop programming skills using the fundamentals and basics of C Language

MODULE I **INTODUCTION TO PROGRAMMING** **9 Hours**

Components of Computers and its Classifications- Problem Solving Techniques – Algorithm- Flowchart- Pseudo code - Program-Compilation -Execution

MODULE II **BASICS OF C PROGRAMMING** **9 Hours**

Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/output statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives.

MODULE III **ARRAYS AND STRINGS** **9 Hours**

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – Example Program: Matrix Operations - String operations

MODULE IV **FUNCTIONS AND POINTERS** **9 Hours**

Introduction to functions: Function prototype, function definition, function call, Built-in functions – Recursion – Example Program – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference

MODULE V **STRUCTURES & FILE PROCESSING** **9 Hours**

Structure - Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Dynamic memory allocation -Files – Types - File processing: Sequential access, Random access -Command line arguments

TOTAL: 45 HOURS

FURTHER READING:

Object Oriented Programming Approach.

COURSE OUTCOMES: EMPLOYABILITY

On the successful completion of the course, students will be able to

CO1: Describe basic concepts of computers

CO2. Paraphrase the operations of number system

CO3: Describe about basic concepts of C-Language

CO4: Understand the code reusability with the help of user defined functions

CO5: Analyze the structure concept, union, file management and preprocessor in C language

REFERENCES:

1. Paul Deitel and Harvey Deitel, —C How to Programl, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in Cl, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in Cl, First Edition, Oxford University Press, 2009.

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1901ENX01	ENGLISH FOR ENGINEERS	L	T	P	C
	(Common for all B.E./B.Tech. Programme)	3	0	0	3

Course Overview :

The course "English for Engineers" aims at honing the basic language skills of the learners. The course is a combination of introducing the rudiments of grammar and application of the principles in both verbal and written expressions. Students are trained to read and comprehend technical texts in the field of engineering. They are guided to acquire vocabulary building and write efficiently in technical writing .The course has been deftly planed and the learners are guided to use the LSRW skills for acquiring their technical knowhow and exhibiting their technical achievement by verbal and written mode .Students are encouraged to use English as a tool to get technical knowledge and display their attainment

Objective: SKILL DEVELOPMENT

- To teach the students to compose grammatically correct sentences for oral as well as written communication.
- To make the learners to interpret perfectly after paying attention to an audio on any theme.
- To expose the students to organize formal presentations effectively.
- To cultivate learners to explain the content of any written or visual material.
- To help the learners to get trained in generate technical and non-technical documents with appropriate contents and context.
- To motivate the students to Monitor, analyse and adjust their own communication.

MODULE I FOCUS ON LANGUAGE (Vocabulary and Grammar) **9 Hours**

Vocabulary -The Concept of Word Formation - Prefixes- Suffixes- Synonyms – Antonyms - Grammar - Articles- Preposition- Adjective-Adverb-Connectives -Tenses (present, past & future) - Conditional Clauses -Active voice –passive voice and Impersonal passive voice – Who- Questions.

MODULE II LISTENING SKILLS **9 Hours**

Listening-Types of Listening -listening to short or longer texts- listening and Note taking- -formal and informal conversations- telephonic etiquettes- narratives from different sources. - Correlative verbal and nonverbal communication - listening to panel members (how to response to panel members after listening panel members) – listening to facing online interviews (or) interviews on video conferencing mode - listening webinars.

MODULE III SPEAKING SKILL **9 Hours**

Speaking - Stress and intonation –Communication skills- Role of ICT in Communication, -Process of communication- oral presentation skills- verbal and non verbal communication-individual and group presentations- impromptu presentation- public speaking- Group discussion- speaking to the panel members (online interviews , video conferencing, online meeting and webinars.

MODULE IV READING SKILLS **9 Hours**

Reading– Intensive Reading –Predicting the content -Comprehending general and technical articles - Cloze reading - Inductive reading- Short narrative and descriptions from newspapers – Skimming and scanning-reading and interpretation-critical reading interpreting and transferring graphical information-

MODULE V WRITING SKILLS **9 Hours**

Writing- Precise writing –Summarizing- Interpreting visual texts (pie chart, bar chart, picture, advertisements etc., - Proposal writing (launching new units or department in a institution or industry & to get loan from bank) -Report writing (accident, progress, project, survey, Industrial visit)- job application-e- mail drafting- letter writing (permission, accepting and decaling)- e.mail drafting instructions –recommendations –checklist- uses of Print and electronic media (internet, fax, mobile, interactive video and teleconferencing, computer) e-governance.

TOTAL: 45 HOURS

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1901GE151	ENGINEERING INTELLIGENCE I (Common for all B.E./B.Tech. Programme)	L	T	P	C
		0	0	2	1

MODULE I BEHAVIORAL CHANGES - TRANSITION OF SCHOOL TO COLLEGE **6 Hours**

Vocabulary -The Concept of Word Formation - prefixes- suffixes- Synonyms – Antonyms - Grammar - Articles-Preposition- Adjective-Adverb-connectives -Tenses (present, past & future) - Sentence pattern-types of sentences -Active voice –passive voice and Impersonal passive voice – Who Questions.

MODULE II EXPOSURE TO INDIVIDUAL COMPETANCE **6 Hours**

Listening- listening intently-arousing and sustaining interest-listening to short or longer texts- formal and informal conversations- telephonic etiquettes- narratives from different sources. -listening and Note taking-correlative verbal and nonverbal communication-listening to TOEFL & IELTS programs-listening to Project presentation- listening to technical seminar and conferences.

MODULE III CAREER PLANNING **6 Hours**

Speaking - stress and intonation –persuasive speaking -Describing person, place and thing – sharing personal information — greetings –taking leave -Individual and Group Presentation-impromptu Presentation-public speaking-Group Discussion- project planning-facing viva voce and delivering project.

MODULE IV INTRODUCTION TO COMMUNICATION SKILLS **6 Hours**

Reading– comprehending general and technical articles -cloze reading - inductive reading- short narrative and descriptions from newspapers – Skimming and scanning-reading and interpretation-critical reading interpreting and transferring graphical information- sequencing of sentences-analytical reading on various Projects.

MODULE V COMMUNICATION EXERCISE-1 **6 Hours**

Writing- Precise writing –Summarizing- interpreting visual texts (pie chart, bar chart, picture - advertisements etc., - Proposal writing (launching new units or department in a institution or industry & to get loan from bank) -report writing (accident, progress, project, survey, Industrial visit)- job application-e- mail drafting- letter writing (permission, accepting and decaling)-instructions –recommendations –checklist.

TOTAL: 30 HOURS

Course Outcomes: SKILL DEVELOPMENT

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

CO1: Apply their knowledge and skill to engineering field

CO2: Understand the value of individual competence

CO3: Apply their skill to career planning and team work

CO4: Illustrate verbal and non-verbal skills

CO5: Use various communication skill exercise to write and interpret the contents

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REFERENCES:

1. Dr.P.Prasad(2012) "The Functional Aspects of COMMUNICATION SKILLS"; fifth Edition; S.K Kataria &Sons Publication

2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.

3. Aruna Koneru (2008) "Professional Communication"; Second edition; Tata McGraw-Hill Publishing Ltd.

1901GEX52	COMPUTER PROGRAMMING LAB (Common for all B.E./B.Tech. Programme)	L 0	T 0	P 2	C 1

EMPLOYABILITY

List of Experiments:

1. Working with word and style sheets
2. Write a C program to implement basic concepts
3. Write a C program to implement Decision Making and Branching statements
4. Write a C program to implement looping statements
5. Write a C program to implement Arrays
6. Write a C program to implement Strings
7. Write a C program to implement pointers
8. Write a C program to implement Structures
9. Write a C program to work with files in C

Total: 45 Hours

References:

1. Paul Deitel and Harvey Deitel, —C How to Programl, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in Cl, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in Cl, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in Cl, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",McGraw-Hill Education, 1996.

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1901HSX51	COMMUNICATION SKILLS LAB (Common to all B.E./B.Tech. Programme)	L	T	P	C
		0	0	2	1

SKILL DEVELOPMENT

List of Experiments:

1. **Activities on Fundamentals of Inter-personal Communication**

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

2. **Activities on Reading Comprehension**

General Vs Local comprehension, reading for facts, guessing meanings from context, Scanning, skimming, and inferring meaning, critical reading & effective googling.

3. **Activities on Writing Skills**

Structure and presentation of different types of writing - letter writing/ Resume writing/e- correspondence/ Proposal writing/Technical report writing/ Portfolio writing - planning for writing- improving one's writing.

4. **Activities on Presentation Skills**

Oral presentations (individual and group) through JAM sessions / seminars / PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.- creative and critical thinking.

5. **Activities on Soft Skills**

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation-Concept and process, pre- interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews-Time management-stress management –paralinguistic features- Multiple intelligences – emotional intelligence – spiritual quotient (ethics) – intercultural communication – creative and critical.

Total: **45 Hours**

References:

1. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication: Principles and Practice", Oxford University Press, New Delhi, 2011.
2. Sudha Rani, D , "Advanced Communication Skills Laboratory Manual" , Pearson Education2011.
3. Paul V. Anderson ,"Technical Communication",. Cengage Learning pvt. Ltd. New Delhi, 2007.
4. "English Vocabulary in Use series", Cambridge University Press 2008.
5. "Management Shapers Series" ,Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad2008.
6. Rizvi and Ashraf M., "Effective Technical Communication", Tata McGrawHill, New Delhi,2005.
7. Jones, D, "The Pronunciation of English", CUP, . Cambridge,2002.

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1901CHX51	ENGINEERING CHEMISTRY LAB (Common for all B.E./B.Tech. Programme)	L	T	P	C
	SKILL DEVELOPMENT	0	0	2	1

List of Experiments:

1. Determination of total temporary & permanent hardness of water by EDTA method
2. Determination of strength of given hydrochloric acid using pH meter
3. Estimation of iron content of the given solution using potentiometer
4. Estimation of sodium present in water using flame photometer
5. Corrosion experiment – weight loss method
6. Determination of molecular weight of a polymer by viscometer method
7. Conductometric titration of strong acid Vs strong Base
8. Estimation of dissolved oxygen in a water sample/sewage by Winkler's method.
9. Comparison of alkalinities of the given water samples
10. Determination of concentration of unknown colored solution using spectrophotometer
11. Determination of percentage of copper in alloy
12. Determination of ferrous iron in cement by spectrophotometry method
13. Adsorption of acetic acid on charcoal
14. Determination the flash point and fire point of a given oil using pen skyMartine closed cup apparatus
15. Determination the calorific value of solid fuels
16. Determination the structural of the compound using chemo software.

Total: 45 Hours

References:

1. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel"s Textbook of practical organic chemistry", LBS Singapore (1994).
2. Jeffery G.H., Bassett J., Mendham J.and Denny vogel"s R.C, "Text book of quantitative analysis chemical analysis"; ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
3. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New Yor (2001).
4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

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1901MA202	ENGINEERING MATHEMATICS-II	L	T	P	C
		3	2	0	4

Aim of the course: To enable the students by studying various aspects of Probability and Statistics, such as, one dimensional random variables, two dimensional random variables, testing of hypothesis, design of experiments to apply for various concepts of Information Technology and Computer Science Engineering.

PREREQUISITES: Statistics and Probability

COURSE CONTENTS

Probability: Probability- Theorems on Probability- Conditional Probability – Baye's Theorem- Discrete and continuous random variables – Moments – Moment generating functions –Real Time Problems

Theoretical Distribution: Discrete Distributions: Binomial, Poisson, Geometric - Continuous Distributions: Uniform, Exponential, Normal distributions- Application of Distribution in Engineering Problems

Two - Dimensional random variables: Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression- Rank Correlation.

Applied Statistics: Measures of Central Tendency – Measures of Dispersion - Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

Testing of Hypothesis: Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Small samples: Test for single mean, difference of means, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Total Hours: 60

COURSE OUTCOMES: SKILL DEVELOPMENT

Upon completion of this course, students will be able to

CO1: Apply the parameters of unpredictable experiments using probability concepts.

CO2: Construct probabilistic models for observed phenomena through discrete and continuous distributions.

CO3: Associate the random variables, by designing joint distribution and correlate the random variables.

CO4: Make use of the concept of testing of hypothesis for small and large samples

CO5: Make use of the concept of classification of design of experiments in optimization problems

REFERENCES BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

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1901PH201	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		3	0	0	3

Aim: To make students understand the semiconductor physics and their applications in computer science and engineering

MODULE I **ELECTRONIC MATERIALS** **9 Hours**

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Occupation probability, Fermi level.

MODULE II **SEMICONDUCTORS** **9 Hours**

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier- Concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal- semiconductor junction (Ohmic and Schottky).

MODULE III **MAGNETIC PROPERTIES OF MATERIALS** **9 Hours**

Magnetic dipole moment - magnetic permeability and susceptibility - diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction-saturation magnetization and Curie temperature – Domain Theory- M-H behaviour – Hard and soft magnetic materials – examples and uses— Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor).

MODULE IV **OPTICAL PROPERTIES OF MATERIALS** **9 Hours**

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (qualitative approach only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

MODULE V **NANO DEVICES** **9 Hours**

Electron density in bulk material – Size dependence of Fermi energy – Quantum confinement – Quantum structures – Density of states in quantum well, quantum wire and quantum dot structure - Band gap of nanomaterials – Tunneling: single electron phenomena and single electron transistor – Quantum dot laser.FET from SWNT– Carbon nanotubes: Properties and applications.

TOTAL: 45 HOURS

COURSE OUTCOMES: SKILL DEVELOPMENT

Upon completion of this course, students will be able to

CO1: Apply the parameters of unpredictable experiments using probability concepts.
CO2: Construct probabilistic models for observed phenomena through discrete and continuous distributions.
CO3: Associate the random variables, by designing joint distribution and correlate the random variables.
CO4: Make use of the concept of testing of hypothesis for small and large samples
CO5: Make use of the concept of classification of design of experiments in optimization problems

REFERENCES:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).

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1901GEX01	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. To introduce basic electrical terminologies and laws
2. To impart knowledge on solving series and parallel circuits
3. To introduce about the three phase system
4. To explain the working principle of dc and ac machines, power plants
5. To familiarize about basic electronic components, circuits, transducers, digital logic and communication systems

MODULE I INTRODUCTION TO DC AND AC CIRCUITS **7 Hours**

Introduction to DC and AC circuits: Ohms law - Kirchhoff's laws - Mesh analysis - Nodal analysis - Generation of AC waveforms - Analysis of R-L, R-C, R-L-C circuits - Introduction to three phase systems - Types of connections.

MODULEII ELECTRICAL MACHINES **6 Hours**

Electrical Machines: DC Generator, DC Motor, Transformer, Induction Motor: Working principle, construction and applications.

MODULEIII MEASURING INSTRUMENTS **6 Hours**

Measuring instruments: Classification of instruments; Voltmeter, Ammeter, Wattmeter, Energy meter, Multimeter, CRO: Principles and operation.

MODULEIV SEMICONDUCTOR DEVICES **7 Hours**

Semiconductor devices: V-I characteristics of PN junction diode and Zener diode; Rectifiers - Half wave and full wave rectifiers; BJT - configurations; Amplifiers & Oscillators: classification, operation and applications; SCR: Construction and V-I characteristics; Basic power converters (Block diagram approach only).

MODULEV DIGITAL SYSTEMS **6 Hours**

Digital systems: Boolean algebra - Reduction of Boolean expressions - De-Morgan''s theorem - Logic gates - Implementation of Boolean expressions.

MODULEVI COMMUNICATION SYSTEMS **6 Hours**

Communication Systems: Model of communication system - Analog and digital, Wired and wireless channel - Block diagram of various communication systems - Microwave, satellite, optical fiber and cellular mobile system.

MODULEVII ELECTRICAL SAFETY AND WIRING **7 Hours**

Electrical safety and wiring: Safety measures in electrical system - Safety devices - types of wiring - Wiring accessories- staircase, fluorescent lamps and corridor wiring - Basic principles of earthing - Types of earthing - layout of generation, transmission and distribution of power (Single line diagram).

TOTAL: 45 HOURS

COURSE OUTCOMES: ENTREPRENEURSHIP / EMPLOYABILITY / SKILL DEVELOPMENT

On the successful completion of the course, students will be able to

CO1: Remember the basic laws and fundamental concepts related to electrical, electronics and communication engineering

CO2: Apply basic concepts to solve problems in DC and AC circuits

CO3: Recall the principle of operation of DC & AC machines and power plants

CO4: Summarize the Boolean algebra and digital logic gates

CO5: Elucidate the characteristics of diode, BJT and applications of amplifiers and oscillators

CO6: Explain the operation of functional blocks of various communication systems

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REFERENCES:

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, PHI Learning, 2010.
2. R. Muthusubramaniam, S. Salaivahanan and K.A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering",Tata McGraw Hill, 2004.
3. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI learning,

1901GEX02	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

1. To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
2. To expose them to existing national standards related to technical drawings

MODULE I CONCEPTS AND CONVENTIONS (Not for Examination) **5 Hours**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

MODULEII PLANE CURVES AND FREE HAND SKETCHING **9 Hours**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of Objects.

MODULEIII PROJECTION OF POINTS, LINES AND PLANE SURFACES **9 Hours**

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

MODULEIV PROJECTION OF SOLIDS **9 Hours**

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

MODULE V PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **9 Hours**

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

MODULE VI ISOMETRIC AND PERSPECTIVE PROJECTIONS **9 Hours**

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

TOTAL: 45+5 HOURS

COURSE OUTCOMES: SKILL DEVELOPMENT

On the successful completion of the course, students will be able to

CO1: Perform free hand sketching of basic geometrical constructions and multiple views of objects.
CO2: Do orthographic projection of lines and plane surfaces.
CO3: Draw projections and solids and development of surfaces.
CO4: Prepare isometric and perspective sections of simple solids.
CO5: Demonstrate computer aided drafting

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REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores.
2. Luzzader, Warren J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2015.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited,

1901GE201 ENGINEERING EXPLORATION

L	T	P	C
2	0	0	2

COURSE OBJECTIVES: SKILL DEVELOPMENT

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating ill-defined problems.
- Undergo several design challenges and work towards the final design challenge
- Apply Design Thinking on the following Streams to

Project Stream 1: Electronics, Robotics, IOT and Sensors
Project Stream 2: Computer Science and IT Applications
Project Stream 3: Mechanical and Electrical tools
Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2- 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with Design Challenge and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

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1901GE254	COMPUTER HARDWARE AND IT ESSENTIALS LAB	L	T	P	C
		0	0	2	1

AIM: This course is used to practice computer hardware components, peripherals and troubleshooting process also learn various IT concepts, practice it

PRE-REQUISITE : Problem Solving and Programming

LIST OF EXPERIMENT

1. Study of hardware components (such as storage devices, I/O devices, CPU, Motherboard, other peripherals).
2. Installation of operating systems (Windows and Linux).
3. Other software installation.
4. Study of network components.
5. Network establishment(configuring IP address, Domain name system)
6. Study of Internet.
7. Introduction to Web.
8. Usage of internet services- Email, File Sharing, Social Media etc.
9. Study of firewalls and Antivirus.
10. Troubleshooting various problems.

TOTAL: 30 HOURS

COURSE OUTCOMES EMPLOYABILITY / ENTREPRENEURSHIP

At the end of this course, students will able to,

CO1: Illustrate various computing components and operations

CO2: Configure various operating systems

CO3: Use various disk operating systems shell commands from problem solving

CO4: Manage networking operations and installing software packages

CO5: Use various internet applications for communication

CO6: Understand web and mobile apps

CO7: Use of various social media applications

REFERENCES:

1. Craig Zacker& John Rourke, "The complete reference: PC hardware", Tata McGraw Hill, New Delhi,2001.
2. Mike Meyers, "Introduction to PC Hardware and Troubleshooting", Tata McGraw Hill, New Delhi,2003.
3. B.Govindarajulu, "IBM PC and Clones hardware trouble shooting and maintenance",
4. Tata McGraw-Hill, New Delhi, 2002
5. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.
6. James F. Kurose, —Computer networking: A Top-Down Approachl, Sixth Edition, Pearson, 2012.
7. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014
8. Craig Zacker& John Rou ke, "The complete reference: PC hardware", Tata McGraw Hill, New Delhi,2001.

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1901GE252	ENGINEERING INTELLIGENCE II	L	T	P	C
		0	0	2	1

Prerequisite: Engineering Intelligence - I

MODULE I VOCABULARY BULIDING — 6 Hours

Parts of Grammar- SVA- Art of Writing- word building activities

MODULEII COMMUNICATION WORKSHOP — 6 Hours

Story Telling- Newspaper Reading-Extempore.

MODULEIII INTERPERSONAL SKILLS — 6 Hours

Personality Development - Creativity and innovation –Critical Thinking and Problem Solving – Work Ethics-Technical Skill Vs Interpersonal Skills

MODULEIV LEADERSHIP& EMPLOYABILITY SKILLS — 6 Hours

Levels of Leadership-Making of leader-Types of leadership-Transactions Vs Transformational Leadership – Exercises - Industry Expectations & Career Opportunities- Recruitment patterns.

MODULE V RESUME BUILDING — 6 Hours

Importance of Resume- Resume Preparation - introducing onself

TOTAL: 30 HOURS

Course Outcomes: SKILL DEVELOPMENT

On the successful completion of the course, students will be able to

CO1: Understand various vocabulary building activities.
CO2: Use various communication skill workshop for reading and writing.
CO3: Apply interpersonal skill to motivate creating and innovating skills.
CO4: Apply various leadership and employability skill to get career opportunities
CO5: Prepare resume with necessary components

REFERENCES:

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxfor Publishers.
2. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007.
3. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017.

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1901GEX51	CAD (COMPUTER AIDED DRAFTING) LAB	L	T	P	C
	EMPLOYABILITY / ENTREPRENEURSHIP	0	0	2	1

List of Experiments:

Basics commands of a CAD software- two-dimensional drawing, editing, layering and dimensioning -coordinate Systems-Drawing practice - orthographic views of simple solids using CAD software.

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, anddimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block,Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
7. Drawing isometric projection of simple objects.
8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Total: 30 Hours

References:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing House Pvt. Ltd., 2014.
2. P.S. Gill, A Textbook of Machine Drawing, Katson books, 2013.
3. R.K. Dhawan, A Textbook of Machine Drawing, S. Chand,2012.
4. K.C. John, Textbook of Machine Drawing, PHI Learning Pvt. Ltd.,2009.

1901GEX53	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L T P C 0 0 2 1

Aim: To apply the fundamentals of Electrical and Electronics Engineering

LIST OF EXPERIMENTS:

1. Experiments related to verification of Ohm"s law and Kirchhoff"s laws
2. Experiments involving logic gates
3. Fan and light control using regulators
4. Design of 6V regulated power supply
5. Energy conservation demonstration experiment using energy meter
6. Waveform generation and calculation of rms and average values
7. IC 555 and IC 741 based experiments
8. Experiments in earthing
9. Staircase wiring and residential building wiring
10. Speed control of DC shunt motor

COURSE OUTCOMES: SKILL DEVELOPMENT

Upon completion of this course, students will be able to

CO1: Design and analyze electronic circuits
CO2: Test digital logic gates
CO3: Control lights and speed of motors
CO4: Measure electrical parameters using instruments
CO5: Generate waveforms
CO6: Construct different wiring schemes.

References: **Total: 30 Hours**

1. Edward Hughes, " Electrical Technology,", Pearson Education
2. D.P. Kothari and Nagrath" Basic Electronics",MH Education 2013.
3. Paul Scherz and Simon Monk "Practical Electronics for inventors" Mc Graw Hill Publications 2013.
4. https://nptel.ac.in/courses/122106025/

1901PHX51	ENGINEERING PHYSICS LAB	L	T	P	C
	SKILL DEVELOPMENT	0	0	2	1

List of Experiments:

1. Determination of wavelength of various colours of mercury spectrum using Laser grating
2. Determination of velocity of liquids using ultrasonic interferometer
3. Determine the dispersive power of a prism using spectrometer
4. Determine the unknown resistance of the given wire using Carey-Foster's Bridge
5. Determine the band gap of the given semiconductor
6. Determine the acceptance angle and particle size using Laser
7. Torsional pendulum – Rigidity modulus of a steel wire
8. Thickness of a thin wire – Air Wedge
9. Measurement of Young's modulus – Uniform and Non-uniform bending
10. Thermal conductivity –Lee's Disc method

Total: 30 Hours

References:

1. 'Practical Physics', R.K. Shukla, AnchalSrivastava, New age international (2011)
2. 'B.Sc. Practical Physics', C.L Arora, S. Chand &Co. (2012)

1901MA302	Engineering Mathematics III	L	T	P	C
	Queuing Model and Network Model	3	2	0	4

PREREQUISITES:

1. Engineering Mathematics - I
2. Engineering Mathematics - II

COURSE OBJECTIVES: SKILL DEVELOPMENT

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To emphasis on more advance topics that are particularly useful in modeling, such as queuing theory.
3. To emphasis on more advance topics that are particularly useful in modeling, such as Markov models and queuing theory.

Module I FOURIER SERIES — 9+3 Hours

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

Module II FOURIER TRANSFORMS — 9+3 Hours

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

Module III QUEUEING MODELS — 9+3 Hours

Characteristics of Queuing Models – Markovian Queues – $(M/M/1):(FIFO/\infty/\infty)$, $(M/M/1):(FIFO/N/\infty)$, $(M/M/C):(FIFO/\infty/\infty)$, $(M/M/C):(FIFO/N/\infty)$models – Little's formulae.

Module IV NETWORK MODEL — 9+3 Hours

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource analysis in Network Scheduling.

Module V TRANSPORTATION AND ASSIGNMENT MODELS — 9+3 Hours

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem

Total: 45+15 Hours

FURTHER READING

1. Linear Programming Problem
2. Replacement Models.

Text/Reference Books

1. Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3.Gross.D and Harris C.M, "Fundamentals of Queuing Theory", Wiley Student Edition, 2004.
4. Robertazzi, "Computer Networks and Systems: Queuing Theory and performance Evaluation", Springer, 3rd Edition, 2006
5.TahaH.A."Operations Research", Pearson education, Asia, 8th Edition, 2007
6.Trivedhi K.S, "Probability and statistics with Reliability, queuing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002
7. Kalavathy S, Operations Research, Second Edition, Vikas Publishing House, 2004.
8.. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html

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1902CS301	DATA STRUCTURES	L	T	P	C
		3	2	0	4

PREREQUISITES:

Programming in C.

COURSE OBJECTIVES:

1. Be exposed to the concepts of ADTs
2. Learn linear data structures – list, stack, and queue.
3. Be exposed to sorting, searching, hashing algorithms
4. Learn to apply Tree and Graph structures

Module I	**LINEAR DATA STRUCTURES - LIST**	**9+3Hours**

Introduction, Data structure Types - Data structure operations - Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists- circularly linked lists- doubly linked lists – applications of lists –Polynomial Manipulation.

Module II	**LINEAR DATA STRUCTURES – STACK AND QUEUE**	**9+3Hours**

STACK: Array implementation, Linked list implementation, Applications of stack: Infix to Postfix, Evaluation of Postfix, Balancing symbols, Nested function calls, Recursion, Towers of Hanoi. QUEUE: Array implementation, Linked List implementation, Circular Queue.

Module III	**SORTING, SEARCHING AND HASH TECHNIQUES**	**9+3Hours**

Sorting algorithms: Insertion sort - Selection sort - Shell sort - Bubble sort - Quick sort - Merge sort - Radix sort – Searching: Linear search –Binary Search Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

Module IV	**NON LINEAR DATA STRUCTURES – TREES**	**9+3Hours**

General trees, Terminology, Representation of trees, Tree traversal- Binary tree, Representation, Expression tree, Binary tree traversal, Binary Search Tree: Construction, Searching, Insertion, Deletion, AVL trees: Rotation, Insertion, Deletion, B-Trees, Splay trees, Red-Black Trees.

Module V	**NON LINEAR DATA STRUCTURES - GRAPHS**	**9+3Hours**

Representation of Graphs – Breadth-first search – Depth-first search – Topological sort – Minimum Spanning Trees – Kruskal's and Prim's algorithm – Shortest path algorithm – Dijkstra's algorithm – Bellman-Ford algorithm – Floyd - Warshall algorithm.

Total:	**45 +15 Hours**

FURTHER READING

1. Applications of queue: Priority queue, Double ended queue.
2. Threaded Binary Tree

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Implement abstract data types for linear data structures
CO2	Apply the different linear data structures to problem solutions.
CO3	Critically analyze the various algorithms
CO4	Have a comprehensive knowledge of Trees and their implementations
CO5	Learn advanced data structures like Graphs and their implementation

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REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2011
2. Seymour Lipschutz, "Data Structures with C", McGraw Hill Education, Special Indian Edition, 2014.
3. A.V.Aho, J.E Hopcroft and J.D.Ullman, "Data structures and Algorithms", Pearson Education, First Edition Reprint 2003.
4. R.F.Gilberg, B.A.Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.
5. ReemaThareja, "Data Structures Using C", Oxford Higher Education , First Edition, 2011.
6. http://nptel.ac.in/courses/106102064/1

1902CS302	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

PREREQUISITES:	1. Programming in C 2. Introduction to Computer
COURSE OBJECTIVES:	
	1. To demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
	2. To understand the concepts behind object-oriented programming using C++
	3. To analyze and understand the functionality of program code written in Java

Module I	INTRODUCTION TO C++	9 Hours
Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions – static members – Objects – pointers and objects – constant objects – nested classes – local classes		
Module II	**CONSTRUCTORS**	**9 Hours**
Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor		
Module III	**INTRODUCTION TO JAVA**	**9 Hours**
Overview of java-data types-variables-operators-arrays-control statements-object and classes- methods-accessspecifiers-static members-finalize methods-constructors-exception handling		
Module IV	**INHERITANCE AND POLYMORPHISM**	**9 Hours**
Inheritance-super keyword-types of inheritance – polymorphism- method overriding-method overloading-abstract class-inner class-interfaces-reflections		
Module V	**STRING HANDLING**	**9 Hours**
String methods-special string operation-string buffer-collection framework: collection interfaces and classes-utility classes: string utility-file utility-I/O utility-entity utility-array utility		
	Total	**45 Hours**

FURTHER READING / SEMINAR :	
	RTTI Function templates ANSI String Objects
COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
CO1	Define the features of C++ supporting object oriented programming
CO2	Understand the major object-oriented concepts such that constructor and operator overloading in C++
CO3	Define the features of Java supporting object oriented programming
CO4	Understand the concepts for Java Inheritance, Polymorphism and Java Reflection
CO5	Demonstrate the working of string builder and string buffer in String handling

REFERENCES:

1. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007
2. H.M.Deitel, P.J.Deitel, "Java how to program", Fifth edition, Prentice Hall of India private limited,2003.
3. Ira Pohl, "Object-Oriented Programming Using C++", Pearson Education Asia, 2003.
4. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.
5. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2003.
6. https://nptel.ac.in/courses/106/105/106105151/
7. https://nptel.ac.in/courses/106105191/

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1902CS303		COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
			3	0	0	3

PREREQUISITES: :	Introduction to Computer, Programming in C

COURSE OBJECTIVES:

1. To make students understand the basic structure and operation of digital computer.
2. To study the concepts of pipelining.
3. To expose the students to the concept of parallelism
4. To familiarize the students with hierarchical memory system including cache Memories and virtual memory.

Module I	STRUCTURE OF COMPUTERS & MACHINE INSTRUCTION	9 Hours

Functional Module s - Basic operational concepts - Bus structures - Software - performance – Technology– Instruction and instruction sequencing – Addressing modes – operations and operands-Basic I/O operations. ALU design – Fixed point and floating point operations

Module II	BASIC PROCESSING MODULE	9 Hours

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

Module III	PIPELINING	9 Hours

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets –Data path and control considerations – Performance considerations – Exception handling.

Module IV	PARALLELISM	9 Hours

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors

Module V	MEMORY AND I/O SYSTEMS	9 Hours

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

	Total:	45 Hours

FURTHER READING / SEMINAR :

ALU operations-MIPS-VLIW-How the processors are made from silicon mud-Creating Data path

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Understand basic operations and instructions
CO2	Design arithmetic and logic Module .
CO3	Design and analyze pipelined control Module s
CO4	Understand parallel processing architectures.
CO5	Evaluate performance of memory systems.

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REFERENCES:

1. William Stallings "Computer Organization and Architecture" , Seventh Edition Reprint, Pearson Education, 2016

2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.

3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2012.

4.V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", 2nd Edition, Pearson Education, 2012.

1902CS304	DIGITAL LOGIC AND MICROPROCESSORS	L	T	P	C
		3	0	2	4

PREREQUISITES:

1. Basic electronics

COURSE OBJECTIVES:

1. Learn the basics of digital functions.
2. Become familiar in combinational and sequential logic circuits.
3. Understand the basics of microprocessor and assembly language programming.

MODULE I	BOOLEAN ALGEBRA AND LOGIC GATES	12 Hours

Boolean algebra: Boolean postulates and laws – SOP and POS – K-map – Quine Mc-Cluskey method.
Logic gates: AND, OR, NOT, NAND, NOR and XOR gates.

MODULE II	COMBINATIONAL LOGIC CIRCUITS	12 Hours

Introduction – adder – subtractor – code converter – multiplexer and de-multiplexer – parity checker and generator – magnitude comparator.

MODULE III	SEQUENTIAL CIRCUITS	12 Hours

Synchronous sequential circuits: Latches – flip flops – characteristic table and equation – realization of one flip flop using other flip flop – synchronous counter design.
Asynchronous sequential circuits: Difference between synchronous and asynchronous circuits – asynchronous counter design – static and dynamic hazards.

MODULE IV	MICROPROCESSOR 8085 AND 8086	12 Hours

8085: Introduction – pin diagram – architecture – addressing modes – instruction set – assembly language programming.
8086: Pin diagram – architecture – addressing modes – instruction set – assembly language programming.

MODULE V	8051 MICROCONTROLLER AND I/O INTERFACING	12 Hours

8051: Pin diagram – architecture – addressing modes – instruction set – assembly language programming.
I/O interfacing: Serial and parallel interfacing – D/A and A/D converter.

Experiments:

Digital:

1. Study of logic gates.
2. Design of adder and subtractor.
3. Design of code converters.
4. Implementation of MUX and DEMUX.
5. Implementation of parity checker and generator.
6. Design of synchronous and asynchronous counter.

Microprocessor:

1. Basic arithmetic operations – 8085.
2. Sorting of an array in ascending and descending order – 8085.
3. Stepper motor interfacing – 8085.
4. Basic arithmetic operations – 8086.
5. Floating point operations – 8086.
12. Arithmetic operations – 8051.

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TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

VHDL programming for combinational and sequential circuits.

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Use different methods to simplify Boolean functions.
CO2	Demonstrate different types of combinational circuits using logic gates.
CO3	Implement various synchronous and asynchronous sequential circuits using logic gates and flip flops.
CO4	Summarize architecture, instructions and addressing modes of 8085, 8085 and 8051.
CO5	Apply programming concepts to make assembly language programs.

1901MCX02	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0
COURSE OBJECTIVES:					
	1.To create awareness among students about the Indian Constitution.				
	2.To acquaint the working conditions of union, state, local levels, their powers and functions.				
	3.To create consciousness in the students on democratic values and principles articulated in the constitution.				
	4.To expose the students on the relations between federal and provincial units.				
	5.To divulge the students about the statutory institutions.				
MODULE I	EVOLUTION OF THE INDIAN CONSTITUTION				6 Hours
1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution.					
MODULE II	GOVERNMENT				6 Hours
Union Government: Executive-President, Prime Minister, Council of Minister **State Government**: Executive: Governor, Chief Minister, Council of Minister **Local Government**: Panchayat Raj Institutions, Urban Government					
MODULE III	RIGHTS AND DUTIES				6 Hours
Fundamental Rights, Directive principles, Fundamental Duties					
MODULE IV	RELATION BETWEEN FEDERAL AND PROVINCIAL UNITS				6 Hours
Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India					
MODULE V	STATUTORY INSTITUTIONS				6 Hours
Elections-Election Commission of India, National Human Rights Commission, National Commission for Women					
	Total:				30 Hours
COURSE OUTCOMES	After completion of the course, Student will be able to EMPLOYABILITY				
CO1	Know the background of the present constitution of India.				
CO2	Understand the working of the union, state and local levels.				
CO3	Gain consciousness on the fundamental rights and duties.				
CO4	Be able to understand the functioning and distribution of financial resources between the centre and states.				
CO5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.				
References:					
1.Durga Das Baslli Introduction to the Constitution of India " Prentice Hall of India, New Delhi.					
2.Subhash Kashyap, Our Parliament, National Book Trust, New Delhi					
3.Peu Ghosh, Indian Government &Politics, Prentice Hall of India, New Delhi					
4. B.Z. Fadia & Kuldeep Fadia, Indian Government &Politics, Lexis Nexis, New Delhi					

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1902CS352	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. Basic Computer knowledge.
2. Programming in C Lab

COURSE OBJECTIVES:

1. Justify the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and Polymorphism.
2. To make the student learn an object oriented way of solving problems using java.
3. To make the students to write programs using multi-threading concepts and handle exceptions.

LIST OF EXPERIMENTS:

1. Write a C++ program using Static Data Members
2. Write a C++ program to implement the Multiple constructor in a class
3. Write a C++ program to implement Operator overloading for Unary and binary operator
4. Write a C++ program to implement Constructor in derived classes
5. Write a Java program to implement Control Statements
6. Write a Java program to implement Multi-threaded programming
7. Write a Java program to implement Multiple Inheritance
8. Write a Java program to implement Polymorphism
9. Write a Java program to implement Exception handling in various cases
10. Write a program to implement various String methods in Java

Total: 45 Hours

ADDITIONAL EXPERIMENTS:

1. Program to overload unary and binary operator as Nonmember function.
2. Write a Java program to develop simple application(project) using OOP's concept.

COURSE OUTCOMES — After completion of the course, Student will be able to

EMPLOYABILITY

CO1	Implement basic C++ programs
CO2	Implement major object-oriented concepts such that constructor and operator overloading in C++
CO3	Implement Java programs with basic features
CO4	Implement the concepts for Java Inheritance, Polymorphism and Java Reflection.
CO5	Demonstrate the working of string builder and string buffer in String handling

REFERENCES:

1. https://lecturenotes.in/practicals/19363-lab-manuals-for-object-oriented-programming
2. http://studentsfocus.com/cs6461-object-oriented-programming-lab-manual
3. http://bietbvrm.ac.in/public/testimonia
4. http://www.srmuniv.ac.in/sites/default/files

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1902CS351	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITES:

1. Basic Computer knowledge.
2. C Programming.

COURSE OBJECTIVES:

1. Be exposed to implementing abstract data types
2. Learn to implement sorting and searching algorithms.
3. Getting exposure in implementing the different data structures

List of Experiments:

1. Write a program to implement Singly Linked List
2. Write a program to implement Stack using Array and Linked List
3. Write a program to implement Queue using Array and Linked List
4. Write a program to implement conversion of Infix Expression to Postfix Expression
5. Write a program to sort a set of elements using bubble sort, insertion sort, shell sort, merge sort and quick sort
6. Write a program to implement searching using linear search and binary Search.
7. Write a program to Implement Binary Search Tree
8. Write a program to Implement Tree traversal Techniques
9. Write a program to Implement Minimum Spanning Tree using Prims and Kruskal Algorithm
10. Write a program to Implement Shortest Path using Dijkstra's algorithm

Total: 45 Hours

Additional Experiments:

1. Program to construct an expression tree for a given tree
2. Implementation of Bellman-Ford algorithm and Floyd - Warshall algorithm

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Design and implement C programs for implementing stacks, queues, linked lists.
CO2	Implement stack applications.
CO3	Develop searching and sorting programs.
CO4	Apply the different data structures for implementing solutions to practical problems.
CO5	Develop recursive programs using trees and graphs

REFERENCES:

1. www.cs.cf.ac.uk/Dave/C/
2. http://www.lysator.liu.se/c/bwk-tutor.html
3. http://en.wikibooks.org/wiki/Data_Structures/Introduction
4. http://www.eskimo.com/~scs/cclass/notes/top.html

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1904GE351		LIFE SKILLS: SOFT SKILL	L	T	P	C
			0	0	2	1

COURSE OBJECTIVES:	The student should be made to:
	1. To develop the students basic soft skills and enable them to get a job.
	2. To develop the students' interpersonal skills and to enable them to respond effectively.
	3. To develop the students selling skills and to enable them to apply in their interview process.
	4. To develop the students' CorporateEtiquette and enable them to respond effectively.
	5.To develop the students' learning by practice of giving different situations.

Module I	Introduction to Soft Skills	6 Hours

Soft Skills an Overview - Basics of Communication – Body Language – Positive attitude –Improving Perception and forming values – Communicating with others.

Module II	Team vs Trust	6 Hours

Interpersonal skills – Understanding others – Art of Listening - Group Dynamics –Essential of an effective team - Individual and group presentations - Group interactions – Improved work Relationship .

Module III	Selling Oneself	6 Hours

How to brand oneself – social media – job hunting – Resume writing – Group Discussion – Mock G.D - .Interview skills – Mock Interview

Module IV	Corporate Etiquette	6 Hours

What is Etiquette – Key Factors – Greetings – Meeting etiquette – Telephone etiquette – email etiquette – Dining etiquette – Dressing etiquette .

Module V	Learning by Practice	6 Hours

My family-Myself-Meeting people-Making Contacts.-A city-Getting about town-Our flat-Home life-Travelling - Going abroad- Going through Customs-At a hotel-Shopping- Eating out- Making a phone call- A modern office- Discussing business.

	Total:	30 Hours

COURSE OUTCOMES: SKILL DEVELOPMENT	
	After completion of the course, Student will be able to
CO1	Communicate effectively in their business environment.
CO2	Improve their interpersonal skills which are mandatory in a corporate world.
CO3	Brand themselves to acquire a job.
CO4	Involve in corporate etiquette.
CO5	Survive in the different situations.

REFERENCES:

1. Dr.k.Alex, "soft skills "Third Edition, S.Chand& Publishing Pvt Limited, 2009
2. Arunakoneru, 'Professional Communication' Second Edition, Tata McGraw-Hill Education, 2008
3. D.K.Sarma,'You & Your Career 'First Edition Wheeler Publishing & Co Ltd, 1999
4. Shiv Khera 'You Can Win' Third Edition Mac Millan Publisher India Pvt Limited, 2005

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1902CS401	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

PREREQUISITES:

Basic Computer knowledge,C Programming

COURSE OBJECTIVES:

1. To help the students in understanding the basic theory of software engineering and to apply these basic theoretical principles to a software project development.
2. To guide students to develop skills that will enable them to construct software of high quality, software that is reliable and that is reasonably easy to understand, modify and maintain.
3. To provide an understanding of why these skills are important.

Module I	**SOFTWARE ENGINEERING CONCEPTS**	**9 Hours**

Software Engineering introduction- Project management concepts - Software engineering paradigms – Generic process models, water fall life cycle model -prototype model - RAD model - spiral model - incremental model – Understanding requirements

Module II	**MANAGING SOFTWARE PROJECTS**	**9 Hours**

Metrics : Metrics in process and project domains - Software measurement - Metrics for software Quality - Integrating metrics in a software engineering process - Estimation , Scheduling – Risk Management – Review Techniques - Software quality assurance.

Module III	**DESIGN CONCEPTS**	**9 Hours**

Design Process - Design Principles - Design Concepts - Software architecture – Architectural style,design and Mapping - user interface design

Module IV	**SOFTWARE TESTING AND DEBUGGING**	**9 Hours**

Testing Fundamentals and strategies - White-box and Black box testing - Basis path testing - dataflow testing - testing for special environments - Module testing, - Integration testing - validation testing - system testing – debugging - software maintenance – software configuration management

Module V	**ADVANCED CONCEPTS**	**9 Hours**

Computer Aided Software Engineering - Clean room software engineering – Reengineering - Reverse Engineering.

Total:	**45 Hours**

FURTHER READING / SEMINAR :

- Version management
- ISO 9000 Quality Standards

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, students will be able to

CO1	Build an appropriate process model for a given project
CO2	Analyse the principles at various phases of software development
CO3	Translate specifications into design and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology
CO4	Define a Project management plan and tabulate appropriate testing plans at different levels during the development of the software
CO5	Understand the software project estimation models and estimate the work to be done and resources required and the schedule for a software project

REFERENCES:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Mc-Graw Hill, 7th Edition, 2010.
2. Ian Sommerville, Software Engineering,, Addison-Wesley, 8th edition, 2006.
3. Steve McConnell, Code Complete, Second Edition, Microsoft Press.
4. Richard E. Fairley, Software Engineering Concepts, McGraw- Hill, 1985
5. https://nptel.ac.in/courses/106105087/#

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1902CS402		OPERATING SYSTEMS	L	T	P	C
			3	0	0	3

PREREQUISITES:	
	Basic Computer knowledge
COURSE OBJECTIVES:	**The student should be made to:**
	1.Understand the structure and functions of OS.
	2. Learn about Processes, Threads and Scheduling algorithms.
	3.Understand the principles of concurrency and Deadlocks.
	4.Learn various memory management schemes.
	5.Study I/O management and File systems.
	6.Learn the basics of Linux system and perform administrative tasks on Linux Servers.

Module I	**INTRODUCTION**	**9 Hours**

Operating System overview – Types of Operating Systems – Operating Systems Structures - Operating System Componenets – Operating System Services – System Calls – System Programs – System Structures - Virtual Machines.

Module II	**PROCESS MANAGEMENT**	**9 Hours**

Processes-Process Concept, Process Scheduling, Co-operating process, Inter process Communication; Threads-Overview, Multithreading Models; CPU Scheduling, Process Synchronization - Critical Section Problem, Semophores, Classic problems of synchronization; Deadlocks - Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks.

Module III	**MEMORY MANAGEMENT**	**9 Hours**

Memory Management: Background – Swapping – Contiguous memory allocation –Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Process creation – Page replacement – Allocation of frames –Thrashing.

Module IV	**FILE SYSTEMS AND I/O SYSTEMS**	**9 Hours**

File System : File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation : Directory implementation – Allocation methods – Free-space management. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID.

Module V	**CASE STUDY**	**9 Hours**

Linux System- Basic Concepts;System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization-Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

Total:	**45 Hours**

FURTHER READING / SEMINAR :	
	Issues on Linux Multi Function Server Study about Stable and Tertiary Storage devices Learn about Multi threading issues in Linux Systems
COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
CO1	Understand Operating System Structure, Operations and Services& Illustrate the operating system concepts and its functionalities.
CO2	Design various Scheduling algorithms and deadlock, prevention and avoidance algorithms.
CO3	Compare and contrast various memory management schemes.
CO4	Analyze the File systems and disk scheduling mechanism.
CO5	Perform administrative tasks on Linux Servers.

REFERENCES:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition Prentice-Hall of India Pvt. Ltd, 2015 .
3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt. Ltd, Third Edition, 2004.

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20-21

1902CS403	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

PREREQUISITES:	
	1.Basic Computer knowledge.
	2. Computer Organization and Architecture

COURSE OBJECTIVES:	
	1. Understand the state-of-the-art in network protocols, architectures and applications.
	2.Gain knowledge about the functions of different network layers.
	3.Familiarize in the various aspects of computer networks.

MODULE I	INTRODUCTION	9

Data Communications – Network Criteria - Components of Networks -Types of Connection - Direction of Data Flow - Network Topologies– Protocols and standards-Categories of Networks –Network Models: The OSI Model - TCP/IP Protocol Suite - Addressing - Networking Devices.

MODULE II	PHYSICAL AND DATA LINK LAYER	10

Physical Layer- Types of errors-Media Access Control: CSMA, CSMA/CD, CSMA/CA-Ethernet-Wireless LAN- Bluetooth Flow Control-Error Control - Error Detection Techniques- HDLC and other Data Link Protocols

MODULE III	NETWORK LAYER	9

Internetworking - IPv4 - IPv6 –Network Layer: Delivery, Forwarding and Routing-Routing Protocols - IP Protocols: ARP and RARP, BOOTP, ICMP, DHCP

MODULE IV	TRANSPORT LAYER	9

Overview of Transport layer, Reliable/Unreliable Transmission, TCP, UDP,– TCP Connection Management - Flow Control – Congestion Control, Congestion Avoidance and Quality of Service: (QoS).

MODULE V	APPLICATION LAYER	8

Domain Name System (DNS): Domain Name Space – DNS in the Internet - HTTP – Email: SMTP, POP3and IMAP - File Transfer Protocol -SNMP-Web Services.

	Total:	45 Hours

FURTHER READING :	
	SSH: Simple Socket Shell - Security Services - Firewalls.

COURSE OUTCOMES:	EMPLOYABILITY / ENTREPRENEURSHIP
	After completion of the course, Student will be able to
CO1	Describe the basics of computer networks and protocols
CO2	Apply the functions of different layers and in depth knowledge of data link layer
CO3	Analyze the different protocols and network layer components.
CO4	Identify the basic functions of transport layer and congestion in networks.
CO5	Explain the working of application layer

REFERENCES:

1.BehrouzA.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2013

2.James F.Kurose and Keith W.Ross, Computer Networking: A Top-Down Approach Featuring the Internet, Pearson Education, 2017

3.Larry L.Peterson and Bruce S.Davie, Computer Networks, Elsevier, 2009

4.Andrew S.Tanenbaum, Computer Networks, Pearson Education, 2010

5.William Stallings, Data and Computer Communication, Pearson Education, 2007

6.profameencse.weebly.com

7.http://nptel.ac.in/courses/106105081/1

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1902CS404		DESIGN & ANALYSIS OF ALGORITHMS	L	T.	P	C
			3	0	0	3

PREREQUISITES:

1. Data Structures

COURSE OBJECTIVES:

1. Learn the algorithm analysis techniques.
2. Become familiar with the different algorithm design techniques.
3. Understand the limitations of Algorithm power

Module I	**INTRODUCTION**	**9 Hours**

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

Module II	**DIVIDE-AND-CONQUER**	**9 Hours**

Divide and conquer methodology – Merge sort – Quick sort – Binary search –Strassen's Matrix Multiplication-Knapsack Problem-Finding Max & Min

Module III	**DYNAMIC PROGRAMMING**	**9 Hours**

Dynamic programming -Warshall's and Floyd' algorithm – Optimal Binary Search Trees – 0/1 Knapsack Problem and Memory functions-Travelling Salesman Problem.

Module IV	**BACKTRACKING**	**9 Hours**

Backtracking – n-Queens problem – Graph Coloring Problem-Hamiltonian Circuit Problem – Subset Sum Problem

Module V	**BRANCH AND BOUND**	**9 Hours**

Branch and Bound – Assignment problem – Knapsack Problem – Traveling Salesman Problem-Approximation Algorithms for NP – Hard Problems.

TOTAL:	**45 HOURS**

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Iterative Methods – Simplex Linear Problem, Stable Marriage Problem, Bipartite Problem, Max Flow problem

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Analyze the time and space complexity of algorithms
CO2	Design algorithms for various computing problems
CO3	Critically analyze the different algorithm design techniques for a given problem
CO4	Modify existing algorithms to improve efficiency.
CO5	Identify the limitations of algorithms in problem solving.

REFERENCES:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008
5. http://nptel.ac.in/courses/106101060/

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1902CS406		DATABASE MANAGEMENT SYSTEMS	L	T	P	C
			3	0	0	3

PREREQUISITES:

Computer Programming Languages

COURSE OBJECTIVES:

1. To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram
2. To make a study of SQL and relational database design
3. To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.
4. To know about data storage techniques a query processing.
5. To familiarize the students with the different types of databases.

Module I	**INTRODUCTION**	**9 Hours**

Introduction to file system - Introduction to database system - Data Base Architecture - Data Independence – View of Data - Instance and Schema– Data Models- Types of Data Models – Database Languages- Database user and administrator-Entity relationship model - Mapping Cardinalities-Keys, E-R diagrams.

Module II	**QUERY LANGUAGE & OPTIMIZATION**	**9 Hours**

SQL –DDL- DML-DCL-TCL-Embedded SQL-Static Vs Dynamic SQL - Views – Constraints – Triggers-Data Base security and authorization-Query processing and optimization - Functional Dependencies-Normalization

Module III	**TRANSACTION PROCESSING**	**9 Hours**

Transaction Concepts – ACID Properties-Need for Concurrency Control –Schedules- Serializability: Conflict and View - Concurrency Control - Locking Mechanisms – Two phase locking- Time Stamp based Concurrency Control –Deadlock-Recovery Techniques-Immediate update- Deferred update- shadow paging.

Module IV	**FILES AND INDEXING**	**9 Hours**

Overview of Physical Storage Media-RAID -File Organization-File operations – Hashing Techniques – Indexing -Single level and Multi-level Indexes-B+ tree Index Files-B tree Index Files.

Module V	**ADVANCED TOPICS**	**9 Hours**

Data warehousing-Data mining and knowledge discovery-OODBMS- Object Relational Databases –XML Data Base - Cloud based systems – NOSQL introduction -Hbase data model -Database Tuning -Case Study for Design and Manage the Database for any Project.

TOTAL:	**45 HOURS**

FURTHER READING / SEMINAR :

1. Advanced Database Technology
2. Data mining and Data warehousing, Data Analytics

COURSE OUTCOMES: EMPLOYABILITY.

After completion of the course, Student will be able to

CO1	Understand the basic concepts of the database and data models
CO2	Illustrate a database using ER diagrams and map ER into Relations and normalize the Relations
CO3	Acquire the knowledge of query evaluation to monitor the performance of the DBMS
CO4	Acquire the knowledge about different storage techniques and Query Processing
CO5	Explain the basic concepts of various types of Databases

REFERENCES:

1.Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2017.

2. RamezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2013.

3.Thomas M. Connolly and Carolyn E. Begg, —Database Systems - A Practical Approach to Design, Implementation, and Managementl, fifth edition, Pearson Education, 2011

4.C.J.Date, A.Kannan and S.Swamynathan, —An Introduction to Database Systeml, Eighth Edition, Pearson Education, 2012.

5.Raghu Ramakrishnan, —Database Management Systeml, Fourth Edition, McGraw-Hill College

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1901GEX04	BIOLOGY FOR ENGINEERS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES: The objective of this course is to enable learners to understand the basic concepts of biology and its applications in engineering.

Module I **Biology Introduction and its Classification** **7 Hours**

Introduction to Biology, fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Exciting aspect of biology - need to study biology- Discussion about biological observations of 18th Century - major discoveries. Examples from Brownian motion and the origin of thermodynamics - original observation of Robert Brown and Julius Mayor. Classification - morphological, biochemical or ecological. Hierarchy of life forms at phenomenological level. classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology- E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

Module II **Genetics and Macromolecular analysis** **10 Hours**

Genetics - Newton's laws to Physical Sciences"- Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis - part of genetics. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Single gene disorders in humans. Complementation using human genetics.

Macromolecular analysis: analyses of biological processes at the reductionistic level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

Module III **Biomolecules and Enzymes** **10 Hours**

Biomolecules - Molecules of life, monomeric units and polymeric structures. Sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

Enzymes - monitor enzyme catalyzed reactions. Enzyme catalyzereactions. Enzyme classification. Mechanism of enzyme action -two examples. Enzyme kinetics and kinetic parameters. RNA catalysis.

Information Transfer - The molecular basis of coding and decoding genetic information - universal Molecular basis of information transfer. DNA - genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Gene in terms of complementation and recombination.

Module IV **Metabolism and Microbiology** **8 Hours**

Metabolism: principles of energy transactions. Thermodynamics to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP - energy currency. Breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) - synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge

Microbiology Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics

Module V **Bio-inspired Engineering** **10 Hours**

Introduction to biologically-inspired designs (BID for Biomedical and Non-biomedical applications): Human-organs-on-chips; Muscular Biopolymers; Bio-optics; Nanostructures for Drug Delivery; Genetic Algorithms; Artificial neural networks; Swarm intelligence algorithms; Biosensors: role in medical diagnostics (Sensium digital plaster); environmental monitoring; Bio-filters; Bio-robotics; 3D Bio-printing; Self healing concrete.

Total: 45 Hours

COURSE OUTCOMES: SKILL DEVELOPMENT

Upon completion of this course, students will be able to

CO1	Describe how biological observations of 18th Century that lead to major discoveries
CO2	Classify biology based on morphological, biochemical and ecological matters
CO3	Describe the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
CO4	Analyze biological processes at the reductionistic level
CO5	Describe about all forms of life have the same building blocks and yet the manifestations are as

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1901MGX01		TOTAL QUALITY MANAGEMENT	L	T	P	C
			3	0	0	3

Course Objectives: To facilitate the understanding of Quality Management principles and process.

Unit I **INTRODUCTION** **9 Hours**

Introduction – Need for quality – Evolution of quality – Definitions of quality - Dimensions of product and service quality – Basic concepts of TQM – TQM Framework – Contributions of Deming, Juran and Crosby – Barriers to TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Costs of quality.

Unit II **TQM PRINCIPLES** **9 Hours**

Leadership – Strategic quality planning, Quality Councils – Employee involvement – Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating

Unit III **TQM TOOLS AND TECHNIQUES I** **9 Hours**

The seven traditional tools of quality – New management tools – Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

Unit IV **TQM TOOLS AND TECHNIQUES II** **9 Hours**

Control Charts – Process Capability – Concepts of Six Sigma – Quality Function Development (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures.

Unit V **QUALITY SYSTEMS** **9Hours**

Need for ISO 9000 – ISO 9001-2008 Quality System – Elements, Documentation, Quality Auditing – QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors..

Total: **45 Hours**

Further Reading:

1. Engineering economics and cost analysis
2. Construction and planning management

Course Outcomes: SKILL DEVELOPMENT

After completion of the course, Student will be able to

1. Understand the concepts, dimension quality and philosophies of TQM.
2. Understand the principles of TQM and its strategies.
3. Apply seven statistical quality and management tools.
4. Understand TQM tools for continuous improvement.
5. Understand the QMS and EMS.

References:

1. Dale H.Besterfield et al, Total Quality Management, Third edition, Pearson Education (First Indian Reprints 2004).
2. ShridharaBhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition 2002.

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1902CS451	NETWORKS LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITES:

1.Computer Organization and Architecture

2. Computer Programming Languages

COURSE OBJECTIVES:

1. To configure networking in system
2. To Familiarize with different protocols and network components using simulators
3. To gain knowledge about the working of routing algorithms.

List of Experiments:

1.Study Of Colour Coding Jack Rj45 And Do The Following Cabling Works In A Network

A. Cable Crimping

B. Standard Cabling

C. Cross Cabling And

D. Establish A LAN Connection Using Three Systems Using Any Topology with kit.

2.Implementation Of Stop And Wait Protocol And Sliding Window Protocol.

3.Implementation Of Simulation Of ARP And RARP

4.Implementation Of Ping Command .

5.Implementation OfTraceroute Command .

6.Implementation Of Http Socket For Web Page Upload And Download .

7.ImplementingSubnetting.

9.Implementation Of Implementation Of TCP Chat

10.Implementation Of File Transfer UsingTcp And Echo Program

11.Simulation Of Domain Name System And Simulation Of SNMP .

12. Implementation Of RPC .

Total: 45 Hours

Additional Experiments:

Socket programming

Implementation of Networking concepts in Linux

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Identify the different types of cables in networks.
CO2	Configure networking in a system.
CO3	Implement and simulate protocols.
CO4	Compare the performance of different routing algorithms using simulation tools.

REFERENCES:

1.. BehrouzA.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2013

2. James F.Kurose and Keith W.Ross, Computer Networking: A Top-Down Approach Featuring the Internet, Pearson Education, 2012

3. Larry L.Peterson and Bruce S.Davie, Computer Networks, Elsevier, 2009

4. Andrew S.Tanenbaum, Computer Networks, Pearson Education, 2010

5. William Stallings, Data and Computer Communication, Pearson Education, 2007

6. Douglas E.Comer and M.S.Narayanan, Computer Networks and Internets, Pearson Education, 2008.

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1902CS452	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITES:
1.Basic Computer knowledge.
2.C Programming.

COURSE OBJECTIVES:

1. To gain a complete knowledge about UNIX commands.
2. To obtain an overview of distributed operating systems and the related topics of inter process communication models (message passing, remote procedure call, distributed object computing, and shared memory)
3. To know the concepts of process management and synchronization
4. To know the concept of memory management such as best fit, worst fit and so on

List of Experiments:

1. Study of basic Commands in Unix Operating System
2. Write programs using the following system calls (fork, exec, getpid, exit, wait, close, stat, opendir, readdir).
3. Write programs using the I/O system calls (open, read, write, etc).
4. Simulation of Unix commands.
5. Implementation of CPU Scheduling Algorithms(FCFS, SJF, RR, Priorty).
6. Implementation of Page Replacement Algorithms (LRU, OPT, FIFO).
7. Implementation of memory allocation algorithms (First Fit, Best Fit, Worst Fit)
8. Implement the Producer – Consumer problem using semaphores.
9. Simulation of Shared Memory Concept.
10. Implementation of bankers Algorithm.
11. Implement Paging Technique of memory management.
12. Implementation Disk Scheduling Algorithms
13. Study of Linux OS, Android OS.

Total: 45 Hours

ADDITIONAL EXPERIMENTS:

1. Implement some memory management schemes
2. Application Oriented Experiments
3. Mini Project

EMPLOYABILITY

COURSE OUTCOMES: After completion of the course, Student will be able to

CO1	Be familiar with the language and terms of the UNIX/LINUX operating system
CO2	delineate the commands and procedures needed to carry out basic operations on the UNIX/LINUX operating system
CO3	Design, develop and implement a software solution to a given problemwhich employs operating systems tools

REFERENCES:

1. http://www.ee.surrey.ac.uk/Teaching/Unix/unixintro.html
2. https://kb.iu.edu/d/afsk
3. http://www.ch.embnet.org/CoursEMBnet/Pages05/slides/Unix05.pdf
4. http://www.ee.surrey.ac.uk/Teaching/Unix/
5. http://www.comptechdoc.org/os/linux/usersguide/linux_ugshellprogs.html
6. http://www.cs.jhu.edu/~yairamir/cs418/os4/sld025.html

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1902CS453	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITES::

Computer Programming Languages

COURSE OBJECTIVES:

1. Learn to create and use a database
2. Be familiarized with a query language
3. Have hands on experience on DDL Commands
4. Have a good understanding of DML Commands and DCL commands
5. Familiarize advanced SQL queries.
6. Be exposed to different applications

LIST OF EXPERIMENTS:

1	DDL and DML commands
2	Transaction control commands and Aggregate Functions
3	Joins and Nested Queries
4	Constraints and Views
5	High level programming language extensions Control structures
6	Cursors
7	Triggers
8	Procedures, Functions and Report
9	Database Design and implementation with any one front end tool (Mini Project) **Sample list of Projects** 1. Hospital management 2. Railway ticket reservation 3. Student Mark list processing 4. Employee pay roll processing 5. Inventory control 6.Personal Information System 7.Timetable Management System 8.Hotel Management System 9.Online Course Registration System 10.Library Management System
	TOTAL: 45 HOURS

REQUIREMENTS:

Hardware: Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more.

Software:

Front end: Visual Studio or Java or Equivalent

Back end: Oracle / MySQL/ Sql Server DB2 or Equivalent.

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Under MoU with Oracle Academy, a programme Oracle Workforce Development Programme (OWDP) is conducted. In this programme extensive hands-on training on SQL and PL/SQL will be given to students during the Lab sessions.

- Writing SQL queries for Hierarchical retrieval of data (tree structured data)
- Querying Data Dictionary static Views
- Using stored procedures and Functions for implementing object level data security

COURSE OUTCOMES: EMPLOYABILITY

	After completion of the course, Student will be able to
CO1	Design and implement a database schema for a given problem-domain
CO2	Create and maintain tables using various PL/SQL statements
CO3	Apply Triggers, Views and constraints commands to solve real time problems
CO4	Create reports using functions and procedures
CO5	Apply front end and back end tools for real time projects

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1904GE451	LIFE SKILLS : VERBAL ABILITY	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

1. To help students comprehend and use vocabulary words in their day to day communication
2. To apply appropriate reading strategies for interpreting technical and non-technical documents used in job-related settings.
3. To ensure students will be able to use targeted grammatical structures meaningfully and appropriately in oral and written production.
4. To enable the students to arrange the sentences in meaningful unit and to determine whether constructions rely on active or passive voice
5. To Apply the principles of effective business writing to hone communication skills

MODULE I	VOCABULARY USAGE	6 hours

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

MODULE II	COMPREHENSION ABILITY	

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages

MODULE III	BASIC GRAMMAR AND ERROR DETECTION	6 hours

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

MODULE IV	REARRANGEMENT AND GENERAL USAGE	6 hours

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

MODULE V	APPLICATION OF VERBAL ABILITY	6 hours

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing– Indexing –Market surveying.

TOTAL: 30 HOURS

COURSE OUTCOMES SKILL DEVELOPMENT

CO1	Construct new words in their day to day communication.
CO2	Predict the information swiftly while reading passages.
CO3	Elaborate their oral and written communication.
CO4	Rephrase the sentences and able to identify the voice of the sentence.
CO5	Summarize their knowledge of the best practices to craft effective business documents
CO6	Make use of the etiquette in business.

REFERENCES:

1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007

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1901MCX01	ENVIRONMENTAL SCIENCE (Common to all Branches of B.E/ B.Tech)	L	T	P	C
		3	0	0	0

PREREQUISITES:

1. Basic knowledge about the valuable environment
2. Basic knowledge to conserve this precious environment

COURSE OBJECTIVES: SKILL DEVELOPMENT

1. Realize the interdisciplinary and holistic nature of the environment.
2. Understand how natural resources and environment affect the quality of life and stimulate the quest for sustainable development
3. Recognize the socio-economic, political and ethical issues in environmental science.

MODULE I ECOSYSTEMS AND BIODIVERSITY — **10 Hours**

Concept of an ecosystem – structure and function of anecosystem – producers, consumers and decomposers- Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Documentation of the medicinal plants in your native place

MODULE II NATURAL RESOURCES — **10 Hours**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and nonrenewableenergysources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Documentation of the effect of modern Agriculture in your nearby Village

MODULE III ENVIRONMENTAL POLLUTION — **9 Hours**

Definition – Source, causes, effects and control measures of: (a) Air pollution - Mitigation procedures- Control of particulate and gaseous emission, Control of SO_X, NO_x, CO and HC) -Technology for capturing CO_2 (metallo organic frame works)(b) Water pollution – Waste water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies.Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural.

MODULE IV SOCIAL ISSUES AND THE ENVIRONMENT — **8 Hours**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management -environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards- disaster management: floods, earthquake- Public awareness.Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India)

MODULE V HUMAN POPULATION AND THE ENVIRONMENT — **8 Hours**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA) -GIS-remote sensing-role of information technology in environment and human health – Case studies.

Documentation study of the Human health and the environment in nearby Hospital (Statistical report)

TOTAL: 45 HOURS

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V SEMESTER

1901MA501	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

PREREQUISITES:

Engineering mathematics I and II

COURSE OBJECTIVES:

1. Get familiar and understand the fundamental notation in discrete mathematics.
2. Explore the concepts of counting principle and graph theory.
3. Understand and demonstrate the basic concept of an algorithm and its application in combinatorial mathematics.

Module I SET THEORY AND LOGIC — 9 Hours

Sets, function, relation, equivalence relation, Poset, Function logic, Proposition logic, Predicates and quantifiers - Nested quantifiers – Rules of inference - Proofs methods and strategy.

Module II INDUCTION AND COMBINATORICS — 9 Hours

Mathematical induction – In the basics of counting – The pigeon hole principle – Permutation and Combination - Solving linear recurrence relation – Generating function – Principle of inclusion an exclusion.

Module III GRAPH — 9 Hours

Graph – Sub graphs – Operation on graph – Matrix representation of graph, path and connectedness – Graph isomorphism – Euler and Hamilton's paths and graph.

Module IV ALGEBRAIC STRUCTURE — 9 Hours

Algebraic system – Semi groups, Monoids, Groups , Subgroups and their properties – Cyclic groups – Cosets – Permutation groups - Lagrange's theorem – Cayley's theorem – Normal subgroups, Homomorphism of groups – Introduction to rings and fields.

Module V LATTICES AND BOOLEAN ALGEBRA — 9 Hours

Lattices aspartially order sets, properties of lattices – lattices as algebraic system some special lattices – Boolean algebra.

TOTAL: 45 HOURS

COURSE OUTCOMES: SKILL DEVELOPMENT

On completion of the course the students will be able to

CO1	Distinguish between the notion of discrete and continuous mathematical structures.
CO2	Solve the linear recurrence relation using generating function.
CO3	Construct finite state diagram using graph representation.
CO4	Apply mathematical foundations, algorithms, principle and computer science theory in the modeling and design of computer based system.
CO5	Understand the concept and significance of lattice and Boolean algebra in computer science.

REFERENCES

1. Kenneth H, Rosen – Discrete mathematics and its applications, 7th edition, Tata MC grow hill, Delhi 2012.
2. C.L.liu and D.P.Mohapatra – Elements of discrete mathematics, A computer oriented approach, MC grow Hill, Third edition, 2012.
3. Ralph.p, Grimaldi – Discrete and combinatorial mathematics, An applied introduction – Fourth edition person education Asia, Delhi 2002.
4. Trembly J.P and Manohar R – Discrete mathematical structure with application to computer science, Tata MC grow hill, Delhi.
5. Peter J Cameron – combinatorics – Topics, Technique and algorithms, Cambridge University Press.
6. Nptel.ac.in/course/111105035 www.nptel videos in 2012/11/mathematics

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1902CS501		OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
			3	0	0	3

PREREQUISITES:

1. Software Engineering
2. Programming Concepts

COURSE OBJECTIVES:

1. To develop background knowledge as well as core expertise in object oriented System.
2. To provide the importance of the software design process.
3. Learn the basics of OO analysis and design skills the UML design diagrams.

Module I	**UML DIAGRAMS**	**9 Hours**

Introduction to OOAD – Unified Process - UML diagrams - Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package-Component and Deployment Diagrams

Module II	**DESIGN PATTERNS**	**9 Hours**

Object oriented design methodology – GRASP: Designing objects with responsibilities – Patterns– Creator – Information expert – Low coupling –Controller – High cohesion – Designing for visibility - GoF design patterns – Adapter – Singleton – Factory – Strategy – Composite - Facade and observer patterns

ModuleIII	**APPLYING DESIGN PATTERNS**	**9 Hours**

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture - UML package diagram – UML class diagrams - UML interaction diagrams - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition.

Module IV	**IMPLEMENTATION AND APPLICATION**	**9 Hours**

Forward Engineering – Reverse Engineering - Test driven development – Refactoring – UML tools and UML as blueprint - UML state machine diagrams and modeling - UML deployment and component diagrams

Module V	**CODING AND TESTING**	**9 Hours**

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing.

	TOTAL:	**45 HOURS**

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Advanced Design Patterns.
2. Developing SRS Documents.
3. Case Studies: Various tools used in OOAD.

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Create use case documents that capture requirements for a software system.
CO2	Use the UML analysis and design diagrams.
CO3	Apply design patterns that facilitate development and evolution of new models.
CO4	Address the real-world problems by modeling software solutions using UML tools.
CO5	Compare and contrast various testing techniques.

REFERENCES:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2015.
2. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited, 2007
3. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2005.
4. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial", 2000.
5. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable object-oriented software", Addison-Wesley, 2009
6. http://nptel.ac.in/courses/106105153/

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1902CS502	THEORY OF COMPUTATION	L	T	P	C
		3	2	0	4

PREREQUISITES:

1. Basic Programming Knowledge
2. Basic Mathematical Knowledge

COURSE OBJECTIVES:

1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammar; the notions of algorithm, decidability, complexity and computability
2. Enhance / develop student's ability to understand and conduct mathematical proofs for computation and algorithms.
3. Be able to construct Turing machines and Post machines.
4. Understand the notions of decidability and undecidability of problems, Halting problem.

Module I FINITE AUTOMATA — **9+3 Hours**

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without €-moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA– Pumping Lemma for Regular sets – Problems based on Pumping Lemma.

Module II GRAMMARS — **9+3 Hours**

Grammar Introduction– Types of Grammar – Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols – Module productions – Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF.

Module III PUSHDOWN AUTOMATA — **9+3 Hours**

Pushdown Automata- Definations – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL – pumping lemma for CFL – problems based on pumping Lemma

Module IV TURING MACHINES — **9+3 Hours**

Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – The Halting problem – Partial Solvability – Problems about Turing machine- Chomskian hierarchy of languages..

Module V UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS — **9 +3Hours**

Unsolvable Problems and Computable Functions – Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turihg machine. MEASURING AND CLASSIFYING COMPLEXITY: Tractable and Intractable problems- Tractable and possibly intractable problems – P and NP completeness – Polynomial time reductions.

Total: 45 + 15 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Introduction to Infinite Automata Theory
2. Advanced theory of computation.

COURSE OUTCOMES: EMPLOYABILITY

At the end of the course, the student should be able to:

CO1	Demonstrate advanced knowledge of formal computation and its relationship to languages.
CO2	Distinguish different computing languages and classify their respective types.
CO3	Recognize and comprehend formal reasoning about languages.
CO4	Show a competent understanding of the basic concepts of complexity theory.
CO5	To understand the concept of turing machine.

TextBooks:

1. Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008. (MODULE 1,2,3)
2. John C Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007. (MODULE 4,5)

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1903CS001		MOBILE COMPUTING	L	T	P	C
			3	0	0	3

PREREQUISITES:	Computer Networks
COURSE OBJECTIVES:	
	1. To know the components and structure of mobile application development frameworks for Android and Windows OS based Mobiles.
	2. To learn how to work with various mobile application development frameworks.
	3. To be familiar with the capabilities and limitations of mobile devices.

Module I	**OVERVIEW and GSM ARCHITECTURE**	**8 Hours**

Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks
GSM and Other 2G Architectures: GSM, Radio Interfaces of GSM, Protocols of GSM, Localization, Call Handling, Handover, Security, New Data Services, General Packet Radio Service.

Module II	**WIRELESS MEDIUM ACCESS CONTROL, CDMA, 3G, AND4G COMMUNICATION**	**9 Hours**

Multiplexing, Controlling the Medium Access, , Frequency Hopping Spread Spectrum ,Coding Methods , Code Division Multiple Access, IMT -2000 3G Wireless Communication Standard, WCDMA 3G Communication Standards, I-mode, OFDM, Long-term Evolution, WiMaxRel 1.0 IEEE 802.16e, 4G Networks.

Module III	**MOBILE IP NETWORK LAYER & MOBILE TRANSPORT LAYER**	**9 Hours**

Mobile IP Network Layer: IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol. Mobile Transport Layer: Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods for Mobile TCP –layer Transmission, TCP over 2.5G/3G Mobile Networks.

Module IV	**DATABASESAND DATA DISSEMINATION AND BROADCASTING SYSTEMS**	**8 Hours**

Databases: Database Hoarding Techniques, Data Caching, Client- Server Computing and Adaptation, Transaction Models, Query Processing, Data Recovery Process, Issues Relating to Quality Of Service. Data Dissemination and Broadcasting Systems: Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques.

Module V	**MOBILE SYNCHRONIZATION AND MOBILE DEVICES**	**11 Hours**

Mobile Synchronization in Mobile Computing Systems: Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, Sync- Synchronization Language for Mobile Computing, Sync4J Synchronized Multimedia Markup Language (SMIL). Mobile Devices: Server and Management-Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security.

	Total:	**45 Hours**

COURSE OUTCOMES:	Employability
	After completion of the course, Student will be able to
	GSM and CDMA Systems.
	Mobile IP, and Mobile TCP
	Databases and Data Dissemination

REFERENCES :

1. Jochen H. Schiller,"Mobile Communications," Pearson Education, Second Edition, 2007.
2. AsokeTalukder, Roopa Yavagal,"Mobile Computing," Tata McGraw Hill, Second Edition, 2010.

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1902CS551		CASE TOOLS LAB	L	T	P	C
			0	0	2	1

PREREQUISITES:

1. Software Engineering
2. Programming Concepts

COURSE OBJECTIVES:

1. To highlight the importance of object-oriented analysis and design and its limitations.
2. To show how we apply the process of object-oriented analysis and design to software development.
3. To provide the necessary knowledge and skills in using object-oriented CASE tools.

LIST OF EXPERIMENTS:

1. To develop a problem statement and statement of work.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation
9. Draw Component and Deployment diagrams.
10. Practice forward engineering and reverse engineering

TOTAL: 45 HOURS

SUGGESTED DOMAINS FOR MINI PROJECT

1. Passport Automation System
2. Automatic Teller Machine
3. Book bank System
4. Exam Registration
5. Stock maintenance system.
6. E-ticketing
7. Software Personnel management System
8. Recruitment System

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS:

1. Credit card Processing
2. Library Management System.

SUGGESTED SOFTWARE TOOLS: Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and JModule

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Design and implement projects using OO concepts.
CO2	Recognize the role and function of each UML model in developing object-oriented software.
CO3	Apply appropriate design patterns.
CO4	Create code from design.
CO5	Compare and contrast various testing techniques

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1902CS552		MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	C
			0	0	2	1
PREREQUISITES:		Computer Programming Languages: Java				

COURSE OBJECTIVES:	
	1. To explore about the structure of mobile development framework
	2. To analyze the issues of mobile application
	3. To develop the dynamic application using various parts of android projects

List of Experiments:

1. Develop an interactive application with different layout managers
2. Develop Applications with Multiple Activities and a Simple Menu using various View options
3. Develop an application for calculator operation
4. Develop an application that implements multi thread concepts
5. Develop an application using all Google map API functionalities
6. Develop an dynamic application that implements database manipulation
7. Develop an media oriented application using A/V function
8. Develop an application that writes data to the SD card.
9. Develop an application that creates an alert upon receiving a message.
10. Develop an sensor based application for ballgame sensor

Total: 30 Hours

Additional Experiments:

1. Develop an application that makes use of RSS Feed.
2. Write a mobile application that creates alarm clock.

COURSE OUTCOMES: SKILL DEVELOPMENT / ENTREPRENEURSHIP.

After completion of the course, Student will be able to

CO1	To understand the working of mobile application development
CO2	To paraphrase the multiple activity options in one application
CO3	To understand the background data processing about the application
CO4	To analyze the inter-thread communication between the activities and functions
CO5	To describe about the sensor implementation in android

REFERENCES:

1. Android 6 for Programmers: An App-Driven Approach by Paul J. Deitel , Harvey Deitel , Alexander WaldPrentice Hall; 3 edition 2015
2. Android Application Development in 24 Hours, by Carmen Delessio , Lauren Darcey , Shane ConderSams Publishing; 4 edition 2015
3. Android Cookbook: Problems and Solutions for Android Developers by Ian Darwin Shroff/O'Reilly; Second edition 2017
4. Beginning Android Programming with Android Studio by J. F. DiMarzio Wiley publication Fourth edition 2016

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1902MCX03	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	L	T	P	C
	EMPLOYABILITY	2	0	0	0

MODULE I	INTRODUCTION TO CULTURE	6 Hours
Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India		
MODULE II	INDIAN LANGUAGES, CULTURE AND LITERATURE	6 Hours
Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India Indian Languages and Literature-II: Northern Indian languages & literature		
MODULE III	RELIGION AND PHILOSOPHY	6 Hours
Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)		
MODULE IV	FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING)	6 Hours
Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India		
MODULE V	EDUCATION SYSTEM IN INDIA	6 Hours
Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India.		
	TOTAL	30 Hours

REFERENCES:

1. KapilKapoor, "Text and Interpretation: The India Tradition",ISBN: 81246033375, 2005
2. "Science in Samskrit", SamskritaBharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450 494-X, 200
4. S. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. SatyaPrakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M. Hiriyanna, "Essentials of Indian Philosophy", MotilalBanarsidass Publishers, ISBN 13: 978- 8120810990, 2014

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1904GE551	LIFE SKILLS: APTITUDE – 1	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To brush up problem solving skill and to improve intellectual skill of the students
- To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
- To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- To enhance analytical ability of students
- To augment logical and critical thinking of Student

MODULE I	INTRODUCTION TO NUMBER SYSTEM, BASIC SHORTCUTS OF ADDITION, MULTIPLICATION, DIVISION	6 Hours

Classification of numbers – Types of Numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers - LCM and HCF Models - Fractions and Digits – Square, Square roots – Cube, Cube roots – Shortcuts of addition, multiplication, Division.

MODULE II	RATIO AND PROPORTION, AVERAGES	6 Hours

Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding average using assumed mean method.

MODULE III	PERCENTAGES, PROFIT AND LOSS	6 Hours

Introduction Percentage - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on percentages - Problems on Profit and Loss percentage- Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price.

MODULE IV	CODING AND DECODING, DIRECTION SENSE	6 Hours

Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model - Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on direction sense using symbols and notations.

MODULE V	NUMBER AND LETTER SERIES NUMBER AND LETTER ANALOGIES, ODD MAN OUT	6 Hours

Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters - Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy - Problems on number Odd man out - Problems on letter Odd man out - Problems on verbal Odd man out

	TOTAL	30 Hours

COURSE OUTCOMES: SKILL DEVELOPMENT

On the successful completion of the course, students will be able to

CO1	Learners should be able to understand number and solving problems least time using various shortcuts
CO2	Compare two quantities using ratio and proportion, Solve problems on Partnership, Mixture & Allegation and ages least time using shortcuts and apply real life situations
CO3	Learns should be able to understand the concept behind Average and Percentage.
CO4	Workout concepts of Coding and Decoding, ability to visualize directions and understand the logic behind a sequence.
CO5	Learners should be able to find a series the logic behind a sequence.

REFERENCES:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.

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1902CS601	COMPILER DESIGN	L	T	P	C
		3	0	0	3

PREREQUISITES:

1. Theory of computation

COURSE OBJECTIVES:

1. To learn the design principles of a Compiler.
2. To understand, design and implement a lexical analyzer
3. To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation
4. To understand optimization of codes, run time environment and design code generation schemes.

Module I	INTRODUCTION TO COMPILERS	9 Hours

Programming Language basics-Language processors – Analysis of the source program – Translators-Compilation and Interpretation- The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools – Applications of Compiler Technology

Module II	LEXICAL ANALYSIS	9 Hours

Lexical Analysis – Role of the lexical analysis – Input Buffering – Specification of tokens- Recognition of tokens – Lexical analyzer generator- LEX- Finite Automata – Regular Expression to an NFA – Conversion of an NFA to a DFA – Optimization of DFA based pattern matchers.

Module III	SYNTAX ANALYSIS	9 Hours

Need and Role of the Parser – Context-Free Grammars – Writing a Grammar – Top-Down Parsing- Recursive-Descent Parsing FIRST and FOLLOW – LL(1) Grammars- Non recursive Predictive Parsing- Error Recovery in Predictive Parsing Bottom-Up Parsing – Shift-Reduce Parsing –Introduction to LR parsing – SLR Parser – Canonical LR Parser – LALR- Parser Generators- YACC

Module IV	SYNTAX-DIRECTED TRANSLATION & RUN TIME ENVIRONMENT	9 Hours

Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute-Definitions-Design of predictive translator – Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions.

Runtime environments –Storage organizations-stack allocation of space –Access to nonlocal data on the stack-Heap Management- Introduction to Garbage Collection.

Module V	INTERMEDIATE-CODE GENERATION & CODE GENERATION	9 Hours

Intermediate-Code Generation :Variants of Syntax Trees – Three-Address Code – Types and Declarations – Translation of Expressions – Type Checking – Control Flow – Backpatching – Switch-Statements – Intermediate Code for Procedures.

Code Generation: Issues in the Design of a Code Generator The Target Language – Addresses in the Target Code– Basic Blocks and Flow Graphs – Principal Sources of Optimization- Optimization of Basic Blocks – Loops in flow graphs – A Simple Code Generator –Peephole Optimization.

TOTAL:	45 HOURS

FURTHER READING / SEMINAR :

1. Machine-Independent Optimizations
2. Instruction-Level Parallelism

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Design token recognizer using modern tools.
CO2	Design Top-down and Bottom-up parsing Techniques.
CO3	Translate given input to intermediate code
CO4	Explain various phases of a compiler.
CO5	Identify various types of optimizations on intermediate code and generate assembly code.

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REFERENCES:

1. Compilers: Principles, Techniques, and Tools by Alfred V.Aho, MonicaS. Lam, RaviSethi, JeffreyD.Ullman. Pearson Publishers 2008

1902CS602		WEB TECHNOLOGY	L	T	P	C
			3	1	0	4

PREREQUISITES:

1. Basic knowledge in HTML tags & skill of creating web pages should be known .
2. Fundamentals of Programming and Networking & Knowledge of basic Computer hardware and software is also necessary.

COURSE OBJECTIVES:

1. To impart the new concepts in Web Technologies
2. To develop understanding about the different technologies used in the World Wide Web including XML, Perl, Rails and PHP

Module I **Introduction** — **9 +3Hours**

XHTML Evolution of HTML and XHTML- Standard XHTML Document Structure- Basic Text Markup- Images-Hypertext Links-Lists- Tables- Forms- Frames. Cascading Style Sheets Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.

Module II **XML** — **9+3 Hours**

Introduction to SGML – features of XML - XML as a subset of SGML – XML Vs HTML – Views of an XML document - Syntax of XML- XML Document Structure – Namespaces- XML Schemas- simple XML documents – Different forms of markup that can occur in XML documents - Document Type declarations – Creating XML DTDs – Displaying XML Data in HTML browser – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

Module III **PERL** — **9 +3Hours**

Origin and Use of Perl- Scalars and their Operations – Assignment Statements and Simple Input and Output – Control Statements- Fundamentals of Arrays – Hashes REFERENCES- Functions- Pattern Matching – File Input and Output – Simple programs in Perl -Using Perl for CGI Programming.

Module IV **PHP & MySQL** — **9 +3Hours**

Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking - Database Connectivity, Simple programs in PHP and MySQL.

Module V **RAILS & AJAX** — **9+3 Hours**

RAILS - Overview of Rails- Document Requests- Processing Forms- Rails Application with Databases – Layouts

AJAX - Ajax Overview of Ajax – Basics of Ajax – Rails with Ajax.

Total: 45 + 15 Hours

FURTHER READING :

1. Robert W Sebesta, Programming with World Wide Web , 4th ed., Pearson Education ,New Delhi, 2009
2. Deitel & Deitel Internet & World Wide Web How To Program 4th ed., Pearson International Edition Education ,New Delhi, 2009

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Students will be able to

CO1	Develop web pages using basic HTML
CO2	Apply XML techniques in web design
CO3	Implement CGI using Perl
CO4	Implement PHP & MySQL database connectivity for real world applications
CO5	Use AJAX with Rails.

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REFERENCES:

1. Deitel & Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2011
2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2009
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education ,New Delhi, 2009.

1902CS603	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

PREREQUISITES	Computer Knowledge
COURSE OBJECTIVES:	
	1. To learn problem solving methodologies using Artificial Intelligence
	2. Understand a wide variety of Machine Learning Algorithms.
	3. Understand state-of-the-art deep learning methods and applying them for real world data analysis

Module I	**INTRODUCTION**	**9Hours**
Introduction to AI - Agent - Type of Agent - Constraints Satisfaction Problem - Depth First Search - Best First Search - Hill Climbing - Simulated Annealing - A* Algorithms.		
Module II	**KNOWLEDGE & LOGIC**	**9Hours**
Knowledge Representation - Types of Knowledge Representation - Knowledge Base - Preposition Logic - Predicate Logic (FOL) - Syntax and Semantics - Inference in FOL - Resolution and Reputation - Forward and Backward Chain.		
Module III	**MACHINE LEARNING**	**9 Hours**
Foundations for ML and Supervised Machine Learning - ML Techniques overview - Validation Techniques (Cross-Validations) - Feature Selection - Classifications - Naïve Bayes Classifier, K-Nearest Neighbors - Artificial Neural Network - Unsupervised Learning Algorithms.		
Module IV	**DEEP LEARNING**	**9 Hours**
Introduction to DL - Linear Models - Normalization- Dimensionally Reduction - Optimization and Generalization - Spatial Networks - Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience - Case Study..		
Module V	**INTRODUCTION TO ROBOTICS**	**9 Hours**
Fundamentals of Robotics, Robotics History - Basic Blocks of Robots - Types of Robotics - Robotic Technology - Robot Kinematics -Implementation scope in Structure & Programming - Robotic Applications.		
	Total:	**45 Hours**

FURTHER READING:	
	IOT Applications using Machine Learning and Deep Learning
COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
	1. Understand the basics of AI
	2. know about the Knowledge and Logics in AI
	3. Apply common Machine Learning algorithms in practice and implementing their own.
	4. Understand the basic of Deep Learning.
	5. Understand the basics and function towards Robotics.

References:

1. "Artificial Intelligence" -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI
3. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz and Shai Ben-David, Cambridge University Press,2014
4. Deep Learning, John D. Kelleher, MIT Press,2019

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1903CS005		DISTRIBUTED SYSTEMS	L	T	P	C
			3	0	0	3

PREREQUISITES:

1. Operating Systems
2. Computer Networks

COURSE OBJECTIVES:

1. To know the various distributed computing system strategies.
2. To understand the levels of message passing and call semantics.
3. To learn the architecture of Remote Procedure Call.
4. To be aware of the transaction models and deadlocks.
5. To understand the purpose and categories of clock synchronization.

Module I	**BASIC CONCEPTS**	**9 Hours**

Characterization of Distributed Systems – Trends – Resource Sharing – Challenges – System Models– Architectural and Fundamental Models – Types of Networks. Case study: www

Module II	**INTERPROCESS COMMUNICATION AND DISTRIBUTED OBJECTS**	**9 Hours**

Interposes Communication – The API for the Internet Protocols – External Data Representation and Marshalling –Client –Server Communication – Group Communication – Distributed Objects and Remote Invocation– Communication Between Distributed Objects – Remote Procedure Call – Case study: EJB, Java RMI.

Module III	**DISTRIBUTED TRANSACTIONS AND CONCURRENCY CONTROL**	**9 Hours**

Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions – Distributed Deadlocks - Transaction Recovery.

Module IV	**SYNCHRONIZATION AND RESOURCE MANAGEMENT**	**9 Hours**

Time and Global States-Introduction-Clocks, Events and Process States-Synchronizing physical clocks-Logical time and logical clocks-Global States-Distributed Debugging-Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections Algorithm- Multicast Communication.

Module V	**DISTRIBUTED FILE SYSTEM AND NAME SERVICES**	**9 Hours**

Distributed File Systems-Introduction-File service architecture-Network File System- Name Services – introduction -Name Services and the Domain Name System-Directory Services. Case study: CODA

TOTAL:	**45 HOURS**

FURTHER READING / SEMINAR:

1. Google system Architecture
2. Amazon System Architecture

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Acquire knowledge in the basic concepts of distributed system.
CO2	Explain interprocess communication and distributed objects.
CO3	Exemplify the distributed transactions and concurrency control.
CO4	Explain resource management in distributed systems.
CO5	Explain distributed file system and name services.

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REFERENCES:

1. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, Principles and Paradigms, Pearson Education, 2014.
2. Mugesh Singhal, Niranjan G Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw Hill Edition, 2011.
3. M. L. Liu, Distributed Computing Principles and Applications, Pearson Education, 2011.
4.George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Pearson

Syllabus | Course Outcomes

1901HS003	STARTUP ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3

PREREQUISITE:

The course assumes no prior skill or background in design, art, engineering, or prototyping. It is open to all undergraduates and graduate students with an interest in learning design thinking, and is especially recommended for those students planning social-venture and other kinds of design interventions

COURSE OBJECTIVES: ENTREPRENEURSHIP

1. Understand the terminology and conceptual models used in design disciplines
2. Understand how teaching and learning occurs in the design process
3. Recognize the ethical and social dilemmas and obligations of the practice of design
4. Diagnose common adoption barriers in individuals, groups and organizations.
5. Develop a design theory from independent and qualitative research and observations
6. Participate in and lead innovation in creative and collaborative settings
7. Undertake complex and unstructured problem-solving challenges in unfamiliar domains

Module I	**Startup Basics**	**5 Hours**

Startup basics overview, Indian Startup Ecosystem, Problems – Identification, Selection, Evaluation, Validation, Teaming

Module II	**Customer Discovery Process**	**7 Hours**

Customer Discovery Process, Opportunity Identification, Evaluating Opportunities, Customer discovery with at least 15 interviews. Results presentation and hypothesis refinement. Focus on customer segments of the business model canvas.

Module III	**Ideation**	**5 Hours**

Ideation – Brainstorming, Technology driven Ideation, Continued customer discovery and updates to hypothesis. Focus on value proposition of business model canvas.

Module IV	**Market Analysis**	**6 Hours**

Market Analysis – Perform market research, Competitive advantage landscape, Market Size, Go-To Market Strategies, Continued customer discovery and updates to hypothesis. Focus on channels of business model canvas.

Mid-term presentation on startup idea, refined hypothesis through customer discovery

Module V	**Minimum Viable Product**	**5 Hours**

Minimum Viable Product/Validation: Product market fit, use customer discovery in defining the MVP, Build Proof Of Concepts for specific customer use-cases. Focus on metrics of business model canvas.

Module VI	**Business Models**	**7 Hours**

Business Models/Metrics – Chosen business model for the venture, Focus on key resources/activities of business model canvas. Start customer validation phase.

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1903CS024		WEB TECHNOLOGY	L	T	P	C
			3	0	0	3
PREREQUISITE:		Basic Computer Knowledge,Networks				
Course Objectives:						
	1.	To impart the new concepts in Web Technologies				
	2.	To develop understanding about the different technologies used in the World Wide Web including XML, Perl, Rails and PHP				
Prerequisites: Java programming, Visual Programming, Database management systems.						
Module I	**INTRODUCTION**					**9 Hours**
XHTML Evolution of HTML and XHTML Standard XHTML Document Structure- Basic Text Markup- Images-Hypertext Links-Lists- Tables- Forms- Frames. Cascading Style Sheets Introduction to CSS – Levels of Style Sheets- Style Specification Formats- Selector Forms- Property Value Forms – Font Properties- List Properties – Color- Alignment of Text – Background Images- Span and Div Tags.						
Module II	**XML**					**9 Hours**
Introduction to SGML – features of XML - XML as a subset of SGML – XML Vs HTML – Views of an XML document - Syntax of XML- XML Document Structure – Namespaces- XML Schemas- simple XML documents – Different forms of markup that can occur in XML documents - Document Type declarations – Creating XML DTDs – Displaying XML Data in HTML browser						
Module III	**PERL**					**9Hours**
Origin and Use of Perl- Scalars and their Operations – Assignment Statements and Simple Input and Output – Control Statements- Fundamentals of Arrays – Hashes - Functions- Pattern Matching– Simple programs in Perl -Using Perl for CGI Programming.						
Module IV	**PHP**					**9Hours**
Origin and Use of PHP- Overview of PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling- Files-Cookies-Session Tracking -						
Module V	**MySQL**					**9 Hours**
Basics, query design & functions, database operations, procedures, simple programs in php and mysql.						
			Total:			**45 Hours**

COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Students will be able to
CO1	Develop web pages using basic HTML
CO2	Apply XML techniques in web design
CO3	Implement CGI using Perl
CO4	Implement PHP & MySQL database connectivity for real world applications
CO5	Use AJAX with Rails.

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References:

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2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2013
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2012
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson

1902CS652	WEB TECHNOLOGY LAB	L	T	P	C
		0	0	2	1

PREREQUISITES:	1. Basic knowledge in HTML tags & skill of creating web pages should be known .
	2. Fundamentals of Programming and Networking & Knowledge of basic Computer hardware and software is also necessary.

COURSE OBJECTIVES:

1. Learn to develop webpages using HTML and CSS
2. Be familiar with advanced programming such as PHP/Perl
3. Know to use AJAX in implementing Rails

List of Experiments:

1. Basic Programs using HTML
2. Programs using cascading style sheets
3. Programs to create dynamic web pages
4. Programs using HTML & XML as data store
5. Programs using Perl
6. Programs to demonstrate PHP & MySQL database connectivity
7. Programs using Perl
8. Programs using AJAX
9. Programs using Rails
10. Case Study : Create a web application for the given problem statement

Total: 45 Hours

Additional Experiments:

1. Programs for Rails with AJAX
2. Programs to implement JSON

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Develop web pages using basic HTML
CO2	Apply XML techniques in web design
CO3	Implement CGI using Perl
CO4	Implement PHP & MySQL database connectivity for real world applications
CO5	Use AJAX with Rails.

REFERENCES:

1. Deitel & Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2011
2. Kogent Learning Solutions Inc, Web Technologies Black Book, Dreamtech Press, New Delhi, 2009
3. Chris Bates, Web Programming Building Internet Applications 3rd ed., Wiley India Edition, New Delhi, 2009
4. Phil Ballard, Michael Moncur, Sams Teach Yourself Ajax, JavaScript and PHP, Pearson Education ,New Delhi, 2009.
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2010
6. Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2008
7. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2009
8. https://nptel.ac.in/courses/106105084/

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1902CS651		COMPILER LABORATORY	L	T	P	C
			3	0	0	3

PREREQUISITES:	C programming language.
COURSE OBJECTIVES:	
	1. Be exposed to compiler writing tools. Learn to implement the different Phases of compiler
	2.Be familiar with control flow and data flow analysis
	3.Learn simple optimization techniques

LIST OF EXPERIMENTS

1. Implementation of Symbol Table
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implementation of Lexical Analyzer using Lex Tool
4. Generate YACC specification for a few syntactic categories. a) Program to recognize a valid arithmetic expression that uses operator +, - , * and /. b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits. d)Implementation of Calculator using LEX and YACC
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
6. Implement type checking
7. Implement control flow analysis and Data flow Analysis
8. Implement any one storage allocation strategies(Heap, Stack, Static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.

Total: 45 Hours

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: Standalone desktops with C / C++ compiler and Compiler writing tools 30 Nos. (or) Server with C / C++ compiler and Compiler writing tools supporting 30 terminals or more. LEX and YACC

Additional Experiments:

1. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

1. Implement the different Phases of compiler using tools
2. Analyze the control flow and data flow of a typical program
3. Optimize a given program
4. Generate an assembly language program equivalent to a higher level language program

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REFERENCES:

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2012.
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
7. T. M. Mitchell, "Machine Learning", McGraw Hill, 1997.
8. S. Russel and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2009.

1904CS653		SOFTWARE PROTOTYPE DEVELOPMENT LAB	L	T	P	C
			0	0	2	1
		EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT				

COURSE OBJECTIVES:

1. To highlight the importance of Software Development and design and its limitations
2. To show how we apply the process of software development.
3. To provide the necessary knowledge and skills in using Software Development Tools.

Software prototyping is the activity of creating prototypes of software applications, i.e., incomplete versions of the software program being developed.

The purpose of a prototype is to allow users of the software to evaluate developers' proposals for the design of the eventual product by actually trying them out, rather than having to interpret and evaluate the design based on descriptions. Software prototyping provides an understanding of the software's functions and potential threats or issues.[1] Prototyping can also be used by end users to describe and prove requirements that have not been considered, and that can be a key factor in the commercial relationship between developers and their clients.

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The process of prototyping involves the following steps

1. Identify basic requirements
   Determine basic requirements including the input and output information desired. Details, such as security, can typically be ignored.
2. Develop initial prototype
   The initial prototype is developed that includes only user interfaces. (See Horizontal Prototype, below)
3. Review
   The customers, including end-users, examine the prototype and provide feedback on potential additions or changes.
4. Revise and enhance the prototype
   Using the feedback both the specifications and the prototype can be improved. Negotiation about what is within the scope of the contract/product may be necessary. If changes are introduced then a repeat of steps #3 and #4 may be needed.

Tools : Efficiently using prototyping requires to have the proper tools and a staff trained to use those tools. Tools used in prototyping can vary from individual tools, such as 4th generation programming languages used for rapid prototyping to complex integrated CASE tools. 4th generation visual programming languages like Visual Basic and ColdFusion are frequently used since they are cheap, well known and relatively easy and fast to use. CASE tools, supporting requirements analysis, like the Requirements Engineering Environment are often developed or selected by the military or large organizations. Object oriented tools are also being developed like LYMB from the GE Research and Development Center. Users may prototype elements of an application themselves in a spreadsheet.

As web-based applications continue to grow in popularity, so too, have the tools for prototyping such applications. Frameworks such as Bootstrap, Foundation, and AngularJS provide the tools necessary to quickly structure a proof of concept. These frameworks typically consist of a set of controls, interactions, and design guidelines that enable developers to quickly prototype web applications.

Tools such as InVision, Adobe Experience Design, Origami, Sketch, Axure, Web Flow, Framer, Atomic, Principle, Just in Mind, BalSamiq Mockups, are also can be used for prototyping.

45 Hours

1904CS654		INDUSTRIAL VISIT PRESENTATION	L	T	P	C
		EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT	0	0	0	1

In order to provide the experiential learning to the students, shall take efforts to arrange at least two industrial visit / field visits in a year. A presentation based on Industrial visits shall be made in this semester and suitable credit may be awarded.

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Grades (Excellent / Good / Satisfactory / Not Satisfactory)	

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1702CS701		CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
			3	0	0	3

PREREQUISITE :

1. Computer Networks
2. Basic knowledge of Number theory and finite field elements.

Course Objectives:

1. To know the principles and methods of conventional and advanced encryption algorithms.
2. To learn the techniques used for message authentication and confidentiality maintenance
3. To understand the network security tools and applications

UNIT I	INTRODUCTION	9 Hours

Computer Security Concepts - OSI Security Architecture - Security Attacks - Services – Mechanisms - Model for Network Security - Classical Encryption Techniques - Symmetric Cipher Model - Substitution – Transposition Techniques - Basic Concepts in Number Theory and Finite Fields - Divisibility and Division Algorithm – Euclidean Algorithm - Modular Arithmetic.

UNIT II	SYMMETRIC CIPHERS	9 Hours

Block Cipher Principles - Data Encryption Standard (DES) - DES Example - Strength of DES - Differential and Linear Cryptanalysis - Block Cipher Design Principles - Advanced Encryption Standard(AES) – Structure – Round Functions - Key Expansion - AES Example - Pseudorandom Number Generation and Stream Ciphers - RC5

UNIT III	ASYMMETRIC CIPHERS & KEY MANAGEMENT	9 Hours

Prime Numbers - Fermat's and Euler's Theorems - Testing for Primality - Chinese reminder theorem Discrete Logarithms - Public-Key Cryptography and RSA - Diffie-Hellman Key Exchange - Key Management and Distribution - Symmetric Key Distribution Using Asymmetric Encryption - Distribution of Public Keys - X.509 Certificates - Public Key Infrastructure.

UNIT IV	CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS	9 Hours

Cryptographic Hash Functions - Applications - Two Simple Hash Functions - Requirements and Security Hash Functions based on Cipher Block Chaining - Secure Hash Algorithm (SHA) - SHA-3 – Message Authentication Codes - Requirements – Functions - Security of MACs - MACs based on Hash Functions: HMAC – Digital Signatures - Digital Signature Standard (DSS) – Kerberos- Electronic Commerce Security

UNIT V	NETWORK AND INTERNET SECURITY	9 Hours

Transport Level Security - Web Security Issues - Secure Sockets Layer (SSL) - Transport Layer Security (TLS)- HTTPS - Secure Shell (SSH) - Electronic Mail Security - Pretty Good Privacy (PGP) - S/MIME - IP Security – Firewalls- Viruses and worms

	Total:	45 Hours

Further Reading:

1. Digital Watermarking and Steganography
2. International Data Encryption Algorithm (IDEA)

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Explain the fundamental principles of cryptographic techniques.
CO2	Analyze the cryptographic algorithms for symmetric ciphers.
CO3	Evaluate asymmetric key algorithms and acquire knowledge in key management.
CO4	Explain cryptographic data integrity algorithms.
CO5	Identify the issues and protocols in network security.

References:

1. William Stallings, Cryptography and Network security Principles and Practices, 6th edition, Pearson Education, 2014
2. William Stallings, Network security essentials – application and standards, Prentice Hall of India , 2010

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1702CS702		SOFTWARE PROJECT MANAGEMENT	L	T	P	C
			3	0	0	3

PREREQUISITE :	
	Software Engineering

COURSE OBJECTIVES:

1. To provide a strong foundation on the concept of software project development
2. To learn the concepts on project management and evaluation.
3. To understand the principles of management and team organization.

UNIT I	PROJECT EVALUATION AND PROJECT LIFE CYCLE	9 Hours

Understanding software projects – Project management vs. product management – stages of project management – Software project life cycle - Managerial issues.

UNIT II	ACTIVITY PLANNING AND RISK MANAGEMENT	9 Hours

Project initiation – Identifying project – Developing project character – Identifying stack holders – Requirement analysis – Gathering requirements – Requirements types – Project scope planning – Resource breakdown structure (RBS) – Manpower planning – Quality planning – Time and Cost estimates – Risk management planning – Procurements for the project.

UNIT III	COST ESTIMATION TECHNIQUES	9 Hours

Software effort estimation techniques: KLOC/SLOC estimation, expert opinion, top-down and bottom-up approach, use-case point estimates, object point estimates, Delphi technique – Project test plan – Software quality assurance (SQA) – Software quality control (SQC) – cost of quality – Software quality Metrics – SEI-CMMi model

UNIT IV	RISK MANAGEMENT AND CONTROL	9 Hours

Understanding Project risk management process – risk management planning – identification of risks – risk analysis – risk-response planning – Monitoring the risks – Role of project manager – Leadership styles – recruitment process – team development stages – Conflict management in Project environment – Hiring and firing issues in software project management – Communication process

UNIT V	ADVANCED TOPICS	9 Hours

Project scheduling – Activity diagrams – Network diagrams – PERT & CPM for Schedule development – Schedule compression technique – Critical chain method – Software project scheduling tools – Program - Project-Program-Portfolio relationships - Project portfolio – Project Management Careers.

	Total:	45 Hours

FURTHER READING:

1. Import of the internet on project Management
2. Classification of Software Metrics

COURSE OUTCOMES: EMPLOYABILITY | ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Identify and build an appropriate process model for a given project
CO2	Analyse the principles at various phases of software development
CO3	Translate specifications into design, and identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology
CO4	Define a Project Management Plan and tabulate appropriate Testing Plans at different levels during the development of the software
CO5	Understand the software project estimation models and estimate the work to be done resources required and the schedule for a software project

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REFERENCES:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

1702CS703	BIG DATA ANALYTICS	L	T	P	C
		3	0	0	3

PREREQUISITE	Database management Systems

COURSE OBJECTIVES:

1. Be exposed to big data
2. Learn the different ways of Data Analysis
3. Learn the mining and clustering
4. Be familiar with the data streams and visualization

UNIT I INTRODUCTION TO BIG DATA — 9 Hours

Introduction to Big Data Platform – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting – Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II DATA ANALYSIS — 9 Hours

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics – Rule induction – Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III MINING DATA STREAMS — 9 Hours

Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Real time Analytics Platform(RTAP) applications – case studies – real time sentiment analysis, stock market predictions.

UNIT IV FREQUENT ITEMSETS AND CLUSTERING — 9 Hours

Mining Frequent itemsets – Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V FRAMEWORKS AND VISUALIZATION — 9 Hours

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systems – Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications

Total: 45 Hours

FURTHER READING:

1. Analyzing big data with twitter
2. Big data for Ecommerce and Big data for blogs

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Apply the statistical analysis methods.
CO2	Compare and contrast various soft computing frameworks
CO3	Design distributed file systems
CO4	Apply Stream data model.
CO5	Use Visualisation techniques

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References:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

1702CS704	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

PREREQUISITE	Computer Networks
Course Objectives:	
	1. To understand the differences between traditional deployment and cloud computing
	2. To determine whether existing applications to the cloud makes technical and business sense
	3. To learn how to build a transactional web application for the cloud or migrate one to it

UNIT I	CLOUD ARCHITECTURE BASICS	9 Hours

The Cloud –Hype cycle-metaphorical interpretation-cloud architecture standards and interoperability- Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public, private clouds community cloud, role of virtualization in enabling the cloud.

UNIT II	END TO END DESIGN	9 Hours

Requirement analysis: strategic alignment and architecture development cycle-strategic impact-Risk impact-financial impact-Business criteria-technical criteria-cloud opportunities –evaluation criteria and weight-End to end design-content delivery networks-capacity planning-security architecture and design

UNIT III	CLOUD APPLICATION ARCHITECTURES	9 Hours

Development environments for service development; Amazon, Azure, Google App-cloud platform in industry

UNIT IV	HOW TO MOVE APPLICATION INTO THE CLOUD	9 Hours

Web Application Design- Machine Image Design-privacy design –Database management

UNIT V	SPECIALIZED CLOUD ARCHITECTURE	9 Hours

Workload distribution architecture-Dynamic scalability-Cloud bursting-hypervisor clustering-service quality metrics &SLA

Total:	45 Hours

Further Reading:	
	Data Analytics, Cloud Cryptography
COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
CO1	Understand the differences between traditional and Cloud deployment
CO2	Understand technical and business viability of migrating existing applications to cloud
CO3	Deploy cloud applications on AWS and Azure
CO4	Design and build cloud based applications
CO5	Design scalable cloud environment for elastic demands

References:

1. John Rhoton ,Cloud Computing Explained: Handbook for Enterprise Implementation 2013 edition, 2013, recursive press
2. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi,Mastering Cloud Computing: Foundations and Applications Programming,MorganKaufmann,,Elsevier publication, 2013
3. Thomas Erl, ZaighamMahmood, and Ricardo Puttini,Cloud Computing Concepts, Technology & Architecture, PRENTICE HALL,2013
4. Reese, G (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. Sebastopol, CA: O'Reilly Media, Inc. (2009).
5. https://nptel.ac.in/courses/106/105/106105167/

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Syllabus | Course Outcomes

1703ED001	STARTUP ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3

PREREQUISITE:

The course assumes no prior skill or background in design, art, engineering, or prototyping. It is open to all undergraduates and graduate students with an interest in learning design thinking, and is especially recommended for those students planning social-venture and other kinds of design interventions

COURSE OBJECTIVES: EMPLOYABILITY / ENTREPRENEURSHIP

1. Understand the terminology and conceptual models used in design disciplines
2. Understand how teaching and learning occurs in the design process
3. Recognize the ethical and social dilemmas and obligations of the practice of design
4. Diagnose common adoption barriers in individuals, groups and organizations.
5. Develop a design theory from independent and qualitative research and observations
6. Participate in and lead innovation in creative and collaborative settings
7. Undertake complex and unstructured problem-solving challenges in unfamiliar domains

Module I	**Startup Basics**	**5 Hours**
Startup basics overview, Indian Startup Ecosystem, Problems – Identification, Selection, Evaluation, Validation, Teaming		
Module II	**Customer Discovery Process**	**7 Hours**
Customer Discovery Process, Opportunity Identification, Evaluating Opportunities, Customer discovery with at least 15 interviews. Results presentation and hypothesis refinement. Focus on customer segments of the business model canvas.		
Module III	**Ideation**	**5 Hours**
Ideation – Brainstorming, Technology driven Ideation, Continued customer discovery and updates to hypothesis. Focus on value proposition of business model canvas.		
Module IV	**Market Analysis**	**6 Hours**
Market Analysis – Perform market research, Competitive advantage landscape, Market Size, Go-To Market Strategies, Continued customer discovery and updates to hypothesis. Focus on channels of business model canvas.		
	Mid-term presentation on startup idea, refined hypothesis through customer discovery	
Module V	**Minimum Viable Product**	**5 Hours**
Minimum Viable Product/Validation: Product market fit, use customer discovery in defining the MVP, Build Proof Of Concepts for specific customer use-cases. Focus on metrics of business model canvas.		
Module VI	**Business Models**	**7 Hours**
Business Models/Metrics – Chosen business model for the venture, Focus on key resources/activities of business model canvas. Start customer validation phase.		

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1703CS001		SERVICE ORIENTED ARCHITECTURE	L	T	P	C
			3	0	0	3

PREREQUISITE :

1. Basic knowledge of Internet Programming
2. Distributed Systems

COURSE OBJECTIVES:

1. Learn XML fundamentals.
2. Be exposed to build applications based on XML.
3. Understand the key principles behind SOA

UNIT I	**INTRODUCTION TO XML**	**9 Hours**

XML document structure – Well formed and valid documents – Namespaces – DTD –X-Files.

UNIT II	**BUILDING XML- BASED APPLICATIONS**	**9 Hours**

XML Schema - XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

UNIT III	**SERVICE ORIENTED ARCHITECTURE**	**9 Hours**

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA -- Principles of Service orientation – Service layers.

UNIT IV	**WEB SERVICES**	**9 Hours**

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI- Orchestration – Choreography –WS Transactions.

UNIT V	**BUILDING SOA-BASED APPLICATIONS**	**9 Hours**

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines – Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security

TOTAL:	**45 HOURS**

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Web page designing using xml concepts
2. Advanced WS security policies

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	Build applications based on XML.
CO2	Develop web services using technology elements.
CO3	Describe real-world scenarios involving web services
CO4	Describe the need for a platform-independent service contract (WSDL)
CO5	Describe the need for a platform-independent messaging format (SOAP).

REFERENCES:

1. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kauffman/Elsevier, 2011.
2. Darryl Gove, "Multicore Application Programming for Windows, Linux, and Oracle Solaris", Pearson, 2011
3. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier, 5th edition, 2012.

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1702CS751	CLOUD COMPUTING LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE	Computer Networks
COURSE OBJECTIVES:	
	1. Be exposed to tool kits for setting up cloud environment
	2. Learn to use Hadoop
	3. Be familiar with developing applications on cloud

List of Experiments:

1. Study the installation procedure of openstack or opennebula to set up a private cloud
2. Find procedure to run the virtual machine of different configurations. Check how many virtual machines can be utilized at particular time
3. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
4. Install a C compiler in the virtual machine and execute a sample program.
5. Show the virtual machine migration based on the certain condition from one node to the other.
6. Find procedure to install storage controller and interact with it.
7. Find procedure to set up the one node Hadoop cluster.
8. Mount the one node Hadoop cluster using FUSE.
9. Write a program to use the API's of Hadoop to interact with it.
10. Write a wordcount program to demonstrate the use of Map and Reduce tasks

Total: 45 Hours

Additional Experiments:

1. Launch and configure a virtual machine in AWS cloud
2. Install a public webserver in the VM launched in AWS and access the webpage from any anywhere

COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
CO1	Install and set up private cloud.
CO2	Setup Hadoop environment
CO3	Design and Implement applications on cloud

References:

1. John Rhoton ,Cloud Computing Explained: Handbook for Enterprise Implementation 2013 edition, 2013, recursive press.

2. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi,Mastering Cloud Computing: Foundations and Applications Programming,Morgan Kaufmann,,Elsevier publication, 2013

1. Thomas Erl, ZaighamMahmood, and Ricardo Puttini,Cloud Computing Concepts, Technology & Architecture, PRENTICE HALL,2013
2. Reese, G (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. Sebastopol, CA: O'Reilly Media, Inc. (2009).

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1702CS752	NETWORK SECURITY LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE | Computer Networks

COURSE OBJECTIVES:

1. To impart practical knowledge on network security concepts and mechanisms.
2. Experiment and analyze important cryptographic algorithms
3. Experiment security algorithms with efficiently implement key exchange algorithm
4. Learn to use network security tools like GnuPG, KF sensor, Snort.

List of Experiments:

1. Implement the following SUBSTITUTION TECHNIQUES:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
2. Implement the following TRANSPOSITION TECHNIQUES:
   A) Rail fence – row & Column Transformation
3. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1
4. Implement the Signature Scheme – Digital Signature Standard
5. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG)
6. Setup a honey pot and monitor the honeypot on network (KF Sensor)
7. Installation of rootkits and study about the variety of options
8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)
9. Case Study on Snort Installation and Setup.
10. Case Study on Wireshark Installation and Setup.

Total: 45 Hours

Additional Experiments:

1. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.
2. Perform Simple experiments using the sniffer mode, the packet logger mode, and the Network Intrusion Detection mode of Snort.

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	1. Implement the cipher techniques.
CO2	2. Gain practical experience of designing and implementing network security algorithms and protocols
CO3	3. Use different open source tools for network security and analysis

Software Required:

1. Java or equivalent compiler GnuPG
2. KF Sensor or Equivalent
3. Net Stumbler or Equivalent
4. Snort
5. Wireshark
6. Snort or WinIDS AIO software pack

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References:

1. "Cryptography and Network Security" by William Stallings 6th Edition, Pearson Education.
2. http://www.snort.org/docs/snort_manual/
3. http://ussrback.com/docs/papers/IDS/snort_rules.htm.html

1704CS753	SOFTWARE DEVELOPMENT LABORATORY	L	T	P	C
	(MINI PROJECT III)	0	0	2	1
	EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT				

PREREQUISITE :

1. Object Oriented Analysis & Design

COURSE OBJECTIVES:

1. To highlight the importance of Software Development and design and its limitations
2. To show how we apply the process of software development.
3. To provide the necessary knowledge and skills in using Software Development Tools.

LIST OF EXPERIMENTS:

1. Identification of Use cases for each application system and SRS preparation.
2. Formulate Domain Analysis, Elaboration through Modeling and Implementation through state of the art technology available.
3. Coding/Customizing/Wrapping for components/subsystems
4. Testing – Scenario testing and test case preparation for each components/subsystems
5. Builds the spirit of team work in design process.
6. Integration of subsystems and Testing
7. Become proficient in the programming languages

TOTAL: 45 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS :

1. More Project Development and Testing.

COURSE OUTCOMES:

After completion of the course, Student will be able to

CO1	Design and implement projects using Software Components
CO2	Recognize the role and function of each Development model in software System.
CO3	Apply appropriate design patterns.
CO4	Create code from design
CO5	Compare and contrast various testing techniques

REFERENCES:

1. https://www.knowgravity.com
2. http://www.win.tue.nl/
3. https://www.microconsult.de

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1704GE751	LIFE SKILLS: COMPETITIVE EXAMS PREPARATION	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES: SKILL DEVELOPMENT

1. Study the concepts of data structures, algorithms and computer architecture.
2. Study the process and implementation of Operating systems and design of compilers.
3. Familiar with the database ,network and Artificial Intelligence concepts

Data Structures: Recursion. Arrays, Stacks, Queues, Linked lists, Trees, Graphs

Algorithms: Searching – Sorting - Asymptotic worst case time and space complexity – Greedy – Divide & Conquer – Dynamic Programming

Computer Organization: Digital logic,Machine instructions - Addressing modes - Hazards – Pipelining - Memory hierarchy - I/O interface

Operating System: Processes – Threads - Inter-process communication - Concurrency and synchronization – Deadlock - CPU scheduling - Memory management and virtual memory - File systems

Databases: ER model - Relational model: Relational algebra, Tuple Calculus - SQL - Integrity constraints -Normal forms -Transactions and concurrency control

Computer Networks: Layering – Categories – Topology - Flow and Error control techniques – Switching - IPV4/IPv6 - Routing - TCP – UDP - Application layer protocols – Bluetooth - Wi-Fi - Network security – Firewalls - Digital signatures and certificates.

Compiler Design: Theory of Computation - Lexical analysis, parsing, syntax directed translation - Runtime environments - code generation

Artificial Intelligence: Knowledge representation, Knowledge representation using Predicate logic, Use of predicate calculus, Planning with state-space search – partial-order planning, Backward chaining, Forward chaining.

Total: 30 Hours

ASSESSMENT PATTERN :

Marks (Continuous Assessment Only)

Test I 25

Test II 25

Final Examination 50

Total Marks 100

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REFERENCES:

1. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2015.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, Computer Organization, McGraw-Hill, Third Reprint 2015.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2013.
4. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques and Tools , 2nd Edition, Pearson, 2012.
5. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw -Hill, 2015.
6. BehrouzA.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014.
7. Elaine Rich And Kevin Knight Artificial Intelligence, 2nd Edition, Tata Mcgraw-Hill

1703CS804	BIO INFORMATICS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To let the students know the recent evolution in biological science
2. To let the students know the Genome Databases
3. To let the students know the Sequence alignments

Unit I	GENOMICS	9 Hours

Genes, Genomes, Human Genome Project, Rough and Final Draft of Human Genome Project, Goals of Human Genome Project, Vectors: plasmids, Cosmids, bacteriophage, M13 vectors, BAC, YAC and synthetic plasmids. Enzymes: DNA polymerase, restriction endonucleases, topisomerase I and DNA ligase, reverse transcriptase, kinase, alkaline phosphatase, nuclease, RNAse. Application of gene technology, Gene Silencing, Geneknock out and gene therapy

Unit II	GENOME DATABASES AND GENE EXPRESSION AND DNA MICROARRAY	9 Hours

Nucleic acid sequences. Sequence databases: GeneBank, European Molecular Biology Laboratory (EMBL) Nucleotide sequence databank, Introduction, Basic steps for gene expression, genome information and special features, coding sequences (CDS), untranslated regions (UTR's), cDNA library, expressed sequence tags (EST).Tools for microarray analysis; soft-finder, xCluster, MADAM, SAGE, Applications of microarray technology.

Unit III	PROTEOMICS	9 Hours

Proteins and Enzymes; Proteomics classification; tools and techniques in proteomics; gel electrophoresis, gel filtration, PAGE, isoelectric focusing, affinity chromatography, HPLC, ICAT, fixing and spot visualization, Mass spectroscopy for protein analysis, MALDI-TOF, Electro spray ionization (EST), Tandem mass spectroscopy (MS/MS) analysis; tryptic digestion and peptide fingerprinting (PMF).

Unit IV	SEQUENCE ALIGNMENTS	9 Hours

Introduction, Protein sequences, physicochemical properties based on sequence, sequence comparison. Pair-wise sequence alignment, gaps, gap-penalties, scoring matrices, Smith-Waterman and Needleman-Wunsch algorithms for sequence alignments, multiple sequence alignment, comparision, composition and properties, useful programs, ClustalW, BioEDIT, BLASTp, Phylogenetic analysis tools- Phylip, ClustalW, Online phylogenetic analysis.

Unit V	IMMUNOINFORMATICS	9 Hours

Complement fixation, structure and classes of antibodies, genetic basis of antibody diversity. Understanding MHC I and II: structure and antigen presentation, T and B lymphocytes activation and role in humoral and cell mediated immunity. Vaccines live and attenuated, killed, multi-subunit and DNA vaccines. Hypersensitivity and auto immune diseases. ELISA, RIA, Hybridoma Technology.

	Total:	45 Hours

Further Reading:

1. Introduction about Genetic Algorithms
2. Computing tools for Bio informatics

Course Outcomes: Employability

After completion of the course, Student will be able to

1. Practice life-long learning of applied biological science
2. The students would have learnt about tools used in Bio informatics & how to use them.

References:

1. Biotechnology: Current Progress Volume 1 by P. N. Cheremisinoff and L. M. Ferrante. Technomic Publishing Co. Inc
2. Bergey's Manual of Systematic Bacteriology (2nd Ed.), Volumes1 to 4 Springer
3. The Search for Bioactive Compounds from Microorganisms by S. Omura
4. DNA Cloning : A practical approach D.M. Glover and D.B. Hames, RL Press, Oxford, 1995

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1703CS807	DATA CENTRE AND VIRTUALIZATION	L	T	P	C
		3	0	0	3

PREREQUISITE :

1. Computer Networks
2. Computer Organization and Architecture

Course Objectives:

1. Understand the Phases of Journey to the Cloud.
2. Describe the Key Elements of Classic Data Center.
3. Understand the Concepts of Virtualized Data Center

Unit I JOURNEY TO THE CLOUD — 8 Hours

Business Drivers for Cloud Computing, Definition of Cloud Computing, Characteristics of Cloud Computing as per NIST, Steps Involved in Transitioning from Classic Data Center to Cloud Computing Environment

Unit II CLASSIC DATA CENTER (CDC) — 9 Hours

Overview of Classic Data Center, Compute, Storage and Networking, Object Based and Unified Storage Technologies, Business Continuity Overview, Backup, Replication Technologies and CDC Management.

Unit III VIRTUALIZED DATA CENTER (VDC) — 11 Hours

Compute virtualization, Storage Virtualization, Network Virtualization Techniques, Methods for Implementing Desktop Virtualization, their Benefits, and Considerations, Application Virtualization Methods, Benefits, and Considerations.

Unit IV BUSINESS CONTINUITY IN VIRTUALIZED DATA CENTER — 8 Hours

Overview of Business Continuity in Virtualized Data Center, Fault Tolerance Mechanism in Virtualized Data Center, Backup and Recovery of Virtual Machines (VMs), VM Replication and Migration Technologies.

Unit V CLOUD INFRASTRUCTURE AND MANAGEMENT — 9 Hours

Cloud Computing Primer, Overview of Cloud Computing, Cloud Services and Deployment Models, Economics of Cloud, Cloud Infrastructure Framework, Infrastructure Management and Service Creation Tools, Cloud Service Management, Cloud Migration Considerations

Total: 45 Hours

Further Reading:

Cloud evolution-VMware Virtualization Tools- Google Infrastructure- Google Cloud Security

Course Outcomes: EMPLOYABILITY

After completion of the course, Student will be able to

- CO1 Explore the basics of cloud computing.
- CO2 Explain the Classic Data Center and its applications.
- CO3 Build a virtualized Data Center using cloud.
- CO4 Manage the Cloud infrastructure and services.
- CO5 Demonstrate the Cloud Migration Considerations

References:

1. Cloud Infrastructure and Services EMC2 Bangalore Book
2. Anthony T Velte, Cloud Computing: A practical Approach, Tata McGraw Hill, 2011
3. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, Cloud Computing for Dummies, Wiley India, 2013
4. http://nptel.ac.in/courses/106105167/

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1703CS815	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

Course Objectives:

1. To give the introduction about semantic web and ontology
2. To apply the concept community structure and human behaviors in social networks
3. To implement visualization of social networks.

Unit I	Introduction	9 Hours

Graph theory basics-Semantic web-development of social network analysis key concepts and measures in network analysis -global structure-macro structure-personal networks-blogs and communities-web based networks

Unit II	Knowledge representation	9 Hours

Ontologies in semantic web-resource description framework-graph visualizations-notations-SPARQL-web ontology language-UML comparison-ER comparison-xml comparison-web based knowledge representation

Unit III	Modeling and aggregating	9 Hours

state of the art in network-ontological representation-conceptual model-representing identity-determining equality-evaluating smashing-advanced representations-extracting evolution of web community from a series of web archive – detecting communities in social networks – definition of community – evaluating communities – methods for community detection and mining – applications of community mining algorithms – tools for detecting communities social network infrastructures and communities – decentralized online social networks – multi – relational characterization of dynamic social network communities.

Unit IV	Speculation of human behavior	9 Hours

understanding and predicting human behavior for social communities – user data management – inference and distribution – enabling new human experiences – reality mining – context – awareness – privacy in online social networks – trust in online environment – trust models based on subjective logic – trust network analysis – trust transitivity analysis – combining trust and reputation – trust derivation based on trust comparisons – attack spectrum and countermeasures.

Unit V	Applications	9Hours

graph theory – centrality – clustering – node-edge diagrams – matrix representation – visualizing online social networks, visualizing social networks with matrix-based representations – matrix and node-link diagrams – hybrid representations – applications – cover networks – community welfare –collaboration networks – co-citation networks.

	Total:	45 Hours

Course Outcomes: SKILL DEVELOPMENT

	After completion of the course, Student will be able to
CO1	Interpret the concept of semantic web and ontology
CO2	Interpret the basic concepts of random graph model
CO3	Paraphrase the metrics of centrality with real world example
CO4	Interpret the human behaviors and trust model of social network
CO5	Paraphrase the concept of network resilience, ego centric networks, clustering and cohesive subgroups

References:

1. Analyzing Social Networks by Stephen P. Borgatti SAGE Publications Ltd.; 1 edition ,2013
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

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1704CS851	PROJECT WORK	L	T	P	C
	EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT	0	0	18	9

Course Objectives:

The student should be made to:

1. To develop knowledge to formulate a real world problem and project's goals.
2. To identify the various tasks of the project to determine standard procedures.
3. To identify and learn new tools, algorithms and techniques.
4. To understand the various procedures for validation of the product and analysis the cost effectiveness.
5. To understand the guideline to Prepare report for oral demonstrations.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 180 Hours

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