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)

1701MA301	ENGINEERING MATHEMATICS III (Common to B.E - Civil, CSE, EEE, Mech B.Tech- IT Degree Programmes)	L	T	P	C
		3	2	0	4

PREREQUISITE :

1. Engineering Mathematics I
2. Engineering Mathematics II

COURSE OBJECTIVES:

1. To introduce Fourier series analysis and applications in Engineering, apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES **12 Hours**

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

UNIT II FOURIER TRANSFORMS **12 Hours**

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

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **12 Hours**

Formation of partial differential equations – Singular integrals — Solutions of standard types of first order partial differential equations – Lagrange's linear equation — Linear partial differential equations of second order with constant coefficients of homogeneous type- Applications

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **12 Hours**

Classification of PDE – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT V Z – TRANSFORMS AND DIFFERENCE EQUATIONS **12 Hours**

Z - transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z – transform.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Linear Algebra
2. Numerical Solution of non-homogeneous partial differential equations

COURSE OUTCOMES: Skill Development

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

CO1 Use Fourier series analysis which is central to many applications in engineering
CO2 Apply Fourier transform techniques used in wide variety of situations
CO3 Compute the solution of partial differential equations
CO4 Solve boundary value problem using partial differential equation
CO5 Apply Z transform techniques for discrete time systems

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REFERENCES:

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. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007

1702CS301	DATA STRUCTURES	L	T	P	C
		3	2	0	4

PREREQUISITE :

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

UNIT I	LINEAR DATA STRUCTURES – LIST	9+3Hours

Introduction, Basic terminology Data structures - 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 – All operation (Insertion, Deletion, Merge, Traversal)

UNIT 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.

UNIT 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

UNIT 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.

UNIT 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 / CONTENT BEYOND SYLLABUS / SEMINAR :

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

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.

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1702CS302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

PREREQUISITE :

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

UNIT I STRUCTURE OF COMPUTERS & MACHINE INSTRUCTION 9 Hours

Functional units - 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

UNIT II BASIC PROCESSING UNIT 9 Hours

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

UNIT III PIPELINING 9 Hours

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

UNIT IV PARALLELISM 9 Hours

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

UNIT 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 / CONTENT BEYOND SYLLABUS / SEMINAR :

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

COURSE OUTCOMES: EMPLOYABILITY

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

CO1 Understand basic operations and instructions
CO2 Design arithmetic and logic unit.
CO3 Design and analyze pipelined control units
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.

1702CS303	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

PREREQUISITE :	
	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.

UNIT 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.

UNIT 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.

UNIT III	DESIGN CONCEPTS	9 Hours

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

UNIT 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 - UNIT testing, - Integration testing - validation testing - system testing – debugging - software maintenance – software configuration management

UNIT V	ADVANCED CONCEPTS	9 Hours

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

Total:	45 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :	
	Version management
	ISO 9000 Quality Standards

COURSE OUTCOMES:	EMPLOYABILITY / ENTREPRENEURSHIP
	After completion of the course, students will be able to
CO1	Use modern software testing processes in relation to software development and project management.
CO2	Create test strategies and plans, design test cases, prioritize and execute them.
CO3	Identify suitable tests to be carried out. Conduct various types and levels of software testing for a software project
CO4	Implement various test processes for quality improvement
CO5	Identify the software standards for a software project and manage the test process.

REFERENCES:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Mc-Graw Hill, 7th Edition, 2010.
2. Ian Somerville, 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

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1702CS304 **DIGITAL SYSTEMS** L T P C
3 0 0 3

PREREQUISITE :

Basic Electrical and Electronics Engineering

COURSE OBJECTIVES:

1. To train the students in basics of digital functions
2. To impart the students in the designing ability of combinational and sequential circuits
3. To educate the students about different types of memory and programmable devices
4. To teach the students about software skill in VHDL/Verilog HDL

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES **9 Hours**

Boolean Algebra: Boolean postulates and laws – De-Morgan's theorem - principle of duality - boolean expression - minimization of boolean expressions — minterm – maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map minimization – Quine - Mc Cluskey method of minimization.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of logic functions using gates, NAND–NOR implementations – multi level gate implementations - multi output gate implementations. TTL and CMOS Logic and their characteristics – tristate gates

UNIT II COMBINATIONAL LOGICS **9 Hours**

Introduction - design procedure – half adder – full adder – half subtractor – full subtractor – parallel binary adder, parallel binary subtractor – fast adder - carry look ahead adder – serial adder/subtractor - BCD adder – binary multiplier – binary divider - multiplexer/ demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator – Seven segment display

UNIT III SYNCHRONOUS SEQUENTIAL LOGICS **9 Hours**

Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- synchronous counters – synchronous up/down counters – programmable counters – design of synchronous counters: state diagram- state table –state minimization –state assignment - excitation table and maps-circuit implementation - modulo–n counter, Registers – shift registers - universal shift registers - design of synchronous sequential circuits using VERILOG

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGICS **9 Hours**

Design of fundamental mode and pulse mode circuits – asynchronous ripple or serial counter – asynchronous up/down counter - state machines – problems in asynchronous circuits – static and dynamic hazards - design of hazard free switching circuits, design of asynchronous sequential circuits using VERILOG

UNIT V MEMORY AND PROGRAMMABLE LOGIC DEVICES **9 Hours**

Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – write operation – read operation – memory cycle - timing wave forms – memory decoding – memory expansion – static RAM cell- bipolar RAM cell – MOSFET RAM cell – dynamic RAM cell –programmable logic devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Modern Digital Design, Combinational Logic using VHDL Gate Models

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1 Use different methods which are used to simplify the Boolean functions
CO2 Demonstrate different types of combinational circuits to satisfy the user requirements
CO3 Implement various synchronous sequential circuits
CO4 Practice several types of asynchronous counters
CO5 Explain the basics of memory and programmable logic devices
CO6 Discuss the HDL Program for combinational and sequential circuits

REFERENCES:

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008

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1702CS305		OPERATING SYSTEMS	L	T	P	C
			3	0	0	3
PREREQUISITE :						
		Basic Computer knowledge				
COURSE OBJECTIVES:		The student should be made to:				
	1.Study the basic concepts and functions of operating systems.					
	2.Understand the structure and functions of OS.					
	3.Learn about Processes, Threads and Scheduling algorithms					
	4.Understand the principles of concurrency and Deadlocks.					
	5.Learn various memory management schemes					
	6.Study I/O management and File systems.					

UNIT I	INTRODUCTION	5 Hours

Introduction- Operating System Structure - Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security – Distributed Systems –Computing Environments – System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs. OS Generation and System Boot.

UNIT II	PROCESS MANAGEMENT	12 Hours

Processes-Process Concept, Process Scheduling, Operations on Processes, Inter process Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 -Thread and SMP Management. Process Synchronization - Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks. Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks

UNIT III	MEMORY MANAGEMENT	10 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. Case Study: Memory management in Linux

UNIT IV	STORAGE MANAGEMENT	9 Hours

File System : File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation : Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery. Case studies: File system in Linux – File system in Windows XP

UNIT V	I/O SYSTEMS	9 Hours

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux.

	Total:	45 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :	
	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.

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	Understand the Process Concept, Multithreaded Programming, Process Scheduling and Synchronization
CO3	Apply the Concepts of Virtual Memory Management and File Systems
CO4	Analyze the Secondary Storage and I/O Systems
CO5	Evaluate the different Protection and Security Mechanisms for Operating System

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1702CS351	DATA STRUCTURES LAB	L	T	P	C
		0	0	2	1

PREREQUISITE :

Programming in C

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. Representation of records using Structures in C – Creation of Linked List – Manipulation of records in a Linked List
2. Operations on a Stack and Queue – infix to postfix – simple expression evaluation using stacks
3. Linked Stack Implementation – Linked Queue Implementation
4. Implementation of Sorting algorithms
5. Implementation of Linear search and Binary Search.
6. Applications of Stack and Queue
7. Binary Search Tree
8. Tree traversal Techniques
9. Minimum Spanning Trees.
10. Shortest Path Algorithms - Dijkstra's algorithm.

TOTAL: 45 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE 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

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

CO1 Design and implement C programs for implementing stacks, queues, linked lists

CO2 Develop searching and sorting programs.

CO3 Apply the different data structures for implementing solutions to practical problems.

CO4 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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1702CS352	OPERATING SYSTEMS LAB	L	T	P	C
		0	0	2	1

PREREQUISITE :

Programming in C

COURSE OBJECTIVES:

1. To gain a complete knowledge about UNIX commands and shell programming
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. Shell programming using control statements
3. Shell programming using loops, patterns, expansions and substitutions
4. Write programs using the following system calls (fork, exec, getpid, exit, wait, close, stat, opendir, readdir).
5. Write programs using the I/O system calls (open, read, write, etc).
6. Simulation of Unix commands.
7. Implementation of CPU Scheduling Algorithms(FCFS, SJF, RR, Priorty).
8. Implementation of Page Replacement Algorithms (LRU, OPT, FIFO).
9. Implementation of memory allocation algorithms (First Fit, Best Fit, Worst Fit)
10. Implement the Producer – Consumer problem using semaphores.
11. Simulation of Shared Memory Concept.
12. Implementation of bankers Algorithm.
13. Implement Paging Technique of memory management.
14. Implementation Disk Scheduling Algorithms
15. Study of Linux OS, Android OS.

TOTAL: 45 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS

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

COURSE OUTCOMES: EMPLOYABILITY

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

CO1	The student will be familiar with the language and terms of the UNIX/LINUX operating system
CO2	The student will be able to delineate the commands and procedures needed to carry out basic operations on the UNIX/LINUX operating system
CO3	Students can design, develop and implement a software solution to a given problem which 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_ugshellpro.html
6. http://www.cs.jhu.edu/~yairamir/cs418/os4/sld025.html

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1701MA401	PROBABILITY AND QUEUEING THEORY (Common to B.E / B.Tech – CSE, IT)	L	T	P	C
		3	2	0	4

PREREQUISITE:

Engineering Mathematics I
Engineering Mathematics II
Engineering Mathematics III

COURSE OBJECTIVES:

1. To establish the necessary background in basic probability tools and concepts.
2. To provide students with the ability to understand and conduct computer systems modeling and performance analysis.
3. To emphasis on more advance topics that are particularly useful in modeling, such as Markov models and queuing theory.

UNIT I PROBABILITY AND RANDOM VARIABLES 12 Hours

Probability- Conditional probability-Baye"s theorem-Discrete and continuous random variables –Expectation-Variance- Moments – Moment generating functions –Real Time Problems

UNIT II THEORETICAL DISTRIBUTIONS 12 Hours

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

Unit III TWO - DIMENSIONAL RANDOM VARIABLES 12 Hours

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression

UNIT IV RANDOM PROCESSES 12 Hours

Classification – Stationary process – Markov process - Poisson process – Discrete parameter - Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT V QUEUEING MODELS 12 Hours

Birth and Death processes – Single and multiple server queueing models – Little"s formula - Queues with finite waiting rooms- Computer Science Applications - Finite source models - M/G/1 queue – Pollaczek-Khinchine formula - M/D/1 and M/EK/1 as special case

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Transformation of random variables.
2. Series queues, Jackson networks.

COURSE OUTCOMES: SKILL DEVELOPMENT

After completion of the course, Students will be able to

CO1: Determine 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 discrete time Markov chains in probabilistic manner, to model computer systems.
CO5: Solve the queuing approaches problems using basic characteristics of queuing theory.
CO6: Utilize the queuing models to minimize the time of service in a queuing system.

REFERENCES:

1. Ibe.O.C., "Fundamental of Applied Probability and random Processes", Elsevier, Ist Indian Reprint, 2007
2. Gross.D and Harris C.M, "Fundamentals of Queuing Theory", Wiley Student Edition, 2004.
3. Robertazzi, "Computer Networks and Systems: Queuing Theory and performance Evaluation", Springer, 3rd Edition, 2006

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1702CS401		COMPUTER NETWORKS	L	T	P	C
			3	0	0	3

PREREQUISITE :	
	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.

UNIT I	INTRODUCTION	9 Hours
Data Communications – Network Criteria - Components of Networks -Types of Connection - Direction of Data Flow - Network Topologies – Categories of Networks – Network Models: Layered Architecture - The OSI Model - TCP/IP Protocol Suite - Addressing - Networking Devices.		
UNIT II	PHYSICAL AND DATA LINK LAYER	10 Hours
Physical Layer- Guided transmission Media and Wireless Transmission, 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		
UNIT III	NETWORK LAYER	9 Hours
Internetworking - IPv4 - IPv6 –Network Layer: Delivery, Forwarding and Routing-Routing Protocols - IP Protocols: ARP and RARP, BOOTP, ICMP, DHCP		
UNIT IV	TRANSPORT LAYER	9 Hours
Overview of Transport layer, Reliable/Unreliable Transmission, TCP, UDP,– TCP Connection Management - Flow Control – Congestion Control, Congestion Avoidance and Quality of Service: (QoS).		
UNIT V	APPLICATION LAYER	8 Hours
Domain Name System (DNS): Domain Name Space - DNS in the Internet - HTTP – Email: SMTP, POP3 and 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. Behrouz A.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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1702CS402		PROGRAMMING PARADIGMS	L	T	P	C
			3	2	0	4

PREREQUISITE:	Programming for problem Solving
COURSE OBJECTIVES:	
	1. To train the students to implement the object oriented programming fundamentals
	2. To create distributed applications using threads
	3. To create real time graphical application

UNIT I	INTRODUCTION	9+3 Hours
Overview of java-data types-variables-operators-arrays-control statements-object and classes-methods-access specifiers-static members-finalize methods-constructors-exception handling		
UNIT II	INHERITANCE AND POLYMORPHISM	9+3 Hours
Inheritance-super keyword-types of inheritance –polymorphism-method overriding-method overloading-abstract class-inner class-interfaces-reflections		
UNIT III	STRING HANDLING	9+3 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		
UNIT IV	GENERICS AND CONCURRENT PROGRAMMING	9+3Hours
Generics overview-bounded types-wildcard arguments-generics interfaces-generics class hierarchy-restrictions in generics-multithreaded programming: thread model-thread class and runnable interfaces-extending threads-inbuilt methods-thread priorities-synchronization-inter thread communication-deadlock		
UNIT V	GRAPHICAL PROGRAMMING	9+3 Hours
Applets-architecture-working with multidimensional shapes-colors, fonts, images-event handling :event classes-listener interfaces-menus and controls-swing: key features-model view controller-swing packages-interactive application with JDBC		
	Total:	45 + 15 Hours

Further Reading	
1. Basics of Mobile application Development, 2. Java hibernate	
COURSE OUTCOMES:	EMPLOYABILITY
	After completion of the course, Student will be able to
CO1	Explain the classes, methods and constructors in java
CO2	Write a java program for the concepts inheritance and polymorphism
CO3	Describe the concept of collection framework
CO4	Implement the thread models in real time environment
CO5	Implement the swing concepts in interactive applications

References:

1. Murach's Beginning Java with Eclipse by Joel Murach Mike Murach & Associates Inc 2015
2. Java 8 in Action: Lambdas, Streams, and functional-style programming by by Raoul-Gabriel Urma , Mario Fusco , Alan Mycroft Manning Publications; 1 edition 2014
3. Java Cookbook: Solutions and Examples for Java Developers by Ian F. Darwin O'Reilly Media; 3 edition 2014
4. Thinking in Java by Harry Programmers Mind Inc. 2014
5. https://nptel.ac.in/courses/106/105/106105191/

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1702CS403		DESIGN & ANALYSIS OF ALGORITHMS	L	T	P	C
			3	0	0	3

PREREQUISITE :

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

UNIT 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.

UNIT 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

UNIT III	DYNAMIC PROGRAMMING	9 Hours

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

UNIT IV	BACKTRACKING	9 Hours

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

UNIT V	BRANCH AND BOUND	9 Hours

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

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	Design algorithms for various computing problems.
CO2	Analyze the time and space complexity of algorithms.
CO3	Critically analyze the different algorithm design techniques for a given problem.
CO4	Modify existing algorithms to improve efficiency.
CO5	Study of problems that cannot be solved by computers

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. NPTEL Reference: http://nptel.ac.in/courses/106101060/

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1702CS404	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C
	EMPLOYABILITY	3	0	2	4

PREREQUISITE :

1. C Programming
2. Digital Systems

COURSE OBJECTIVES:

1. To understand the architecture and functions of 8085 processor
2. To understand the Architecture of 8086 microprocessor
3. To understand the concepts of 8051 microcontroller
4. To learn the design aspects of I/O and Memory Interfacing circuits.
5. To gain the basic knowledge about advanced processors

UNIT I INTRODUCTION TO MICROPROCESSORS — **9 Hours**

Evolution Of Microprocessors - 8-Bit Processor - 8085 Architecture – Register Organization - Instruction Set – Timing Diagram- Addressing Modes – Interrupts- Interrupt Service Routines- Assembly Language Programming Using 8085.

UNIT II THE 8086 MICROPROCESSOR — **9 Hours**

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines - 8086 signals.

UNIT III MICROCONTROLLER — **9 Hours**

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT IV I/O INTERFACING — **9 Hours**

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT V Advanced Processors — **9 Hours**

Multiprocessor configurations – Intel 80286 – Internal Architectural – Register Organization – Internal Block Diagram – Architectural features and Register Organization of i386, i486 and Pentium processors. ARM architecture.

Total: 45 +15Hours

Experiments:

8085 Programs

1. Basic arithmetic and Logical operations
2. Sorting of an array in Ascending order and Descending order
3. Finding greatest and smallest number in an array
4. Move a data block without overlap
5. Code conversion.
6. Traffic light control
7. Stepper motor control
8. Key board and Display interface
9. A/D and D/A interface and Waveform Generation

8086 Programs using kits and MASM

10. Basic arithmetic and Logical operations
11. Move a data block without overlap
12. Decimal arithmetic and Matrix operations.
13. Floating point operations, string manipulations, sorting and searching
14. Password checking, Print RAM size and system date
15. Counters and Time Delay Peripherals and Interfacing Experiments

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1702CSX02		DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		(Common to CSE and IT)	3	0	0	3

PREREQUISITE: 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 know about data storage techniques a query processing.
4. To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.
5. To familiarize the students with the different types of databases.

UNIT I	INTRODUCTION	9 Hours

Introduction to database - Data Base Architecture - Data Independence - Functional Dependencies —Relational Algebra -Entity relationship model - mapping cardinalities-keys E-R diagrams.

UNIT II	QUERY LANGUAGE & OPTIMIZATION	9 Hours

Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus - SQL — DDL- DML-DCL-TCL-Embedded SQL-Static Vs Dynamic SQL - Views – Constraints – Query processing and optimization- - Normal Forms – 1NF to 5NF-Domain Key Normal Form

UNIT III	TRANSACTION PROCESSING	9 Hours

Transaction Processing – Properties of Transactions –Serializability - Concurrency Control-Locking Mechanisms – Time Stamp ordering –Two phase Commit Protocol-Deadlock-Recovery systems-Log-based recovery.

UNIT 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.

UNIT V	ADVANCED TOPICS	9 Hours

Data warehousing, heterogeneous component systems-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 / CONTENT BEYOND SYLLABUS / 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 special purpose databases and to critique how they differ from traditional database systems
CO5	Explain the basic concepts of distributed databases, XML and Database Security

REFERENCES:

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

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

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1702CS451	NETWORKS LAB	L	T	P	C
		0	0	2	1

PREREQUISITE :

1.Electronics Circuits Lab.

COURSE OBJECTIVES:

1.To configure networking in system
2.To Familiarize with different protocols and network components using java program
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
2.Implementation of Stop and Wait Protocol and Sliding Window Protocol
3. Implementation of distance vector and link state routing
4. Write a code simulating PING and TRACEROUTE commands
5. Create a socket for HTTP for web page upload and download
6. Implementation of Subnetting
7. Applications using TCP and UDP Sockets like a) DNS b). SNMP c). File Transfer
8. Echo client and echo server b. Chat c. File Transfer
9. Write a program to implement RPC (Remote Procedure Call)

TOTAL:45 HOURS

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1.Socket programming
2.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 java program

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.
7. http://nptel.ac.in
8. profameencse.weebly.com

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1702CSX52	DATABASE MANAGEMENT SYSTEMS LAB (Common to CSE and IT)	L	T	P	C
		0	0	2	1

PREREQUISITE:

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, Procedures and Functions).
6. Cursors and Triggers
7. Embedded SQL
8. Procedures, Functions and Report
9. Database Design and implementation with any one front end tool (Mini Project)

Sample list of Projects

a) Hospital management
b) Railway ticket reservation
c) Student Mark list processing
d) Employee pay roll processing
e) Inventory control

TOTAL : 45 HOURS

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

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.

1. Writing SQL queries for Hierarchical retrieval of data (tree structured data)
2. Querying Data Dictionary static Views
3. 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 Embedded SQL 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

REFERENCES:

1. http://ilearning.oracle.com
2. http://coursera.org/

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1704GE451	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1

PREREQUISITE:

Technical English – I and II

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.

UNIT I VOCABULARY USAGE — **6 Hours**

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

UNIT II COMPREHENSION ABILITY — **6 Hours**

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

UNIT III BASIC GRAMMAR AND ERROR DETECTION — **6 Hours**

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

UNIT IV REARRANGEMENT AND GENERAL USAGE — **6 Hours**

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

UNIT 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

ASSESSMENT PATTERN

1. Two assignments (2 x 25 marks = 50 marks)
2. Pragmatic assessment (50 marks)

COURSE OUTCOMES: SKILL DEVELOPMENT

After completion of the course, Student will be able to

CO1	Use new words in their day to day communication.
CO2	Gather information swiftly while reading passages.
CO3	Students are proficient during their oral and written communication.
CO4	Rearrange the sentences and able to identify the voice of the sentence.
CO5	Students use their knowledge of the best practices to craft effective business documents

REFERENCES:

1. Arun Sharma and Meenakshi Upadhyay, 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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1701MA501	DISCRETE MATHEMATICS	L	T	P	C
		3	2	0	4

COURSE OBJECTIVES:

1. Develop ability to analyze the mathematical Logic
2. Explore the concepts of counting principles and graph theory
3. To familiarize the students in understanding algebraic systems and relations

UNIT I **LOGIC AND PROOFS** **9+3Hours**

Propositional Logic – Propositional equivalences-Predicates and quantifiers-Nested Quantifiers-Rules of inference-introduction to Proofs-Proof Methods and strategy

UNIT II **COMBINATORICS** **9+3 Hours**

Mathematical inductions-Strong induction and well ordering-.The basics of counting-The pigeonhole principle –Permutations and combinations-Recurrence relations-Solving Linear recurrence relations-generating functions.

UNIT III **GRAPHS** **9+3 Hours**

Graphs and graph models-Graph terminology and special types of graphs-Representing graphs and graph isomorphism -connectivity-Euler and Hamilton paths

UNIT IV **ALGEBRAIC STRUCTURES** **9+3 Hours**

Algebraic systems-Semi groups and monoids Groups-Subgroups and homomorphisms- Cosets and Lagrange's theorem-Ring & Fields (Definitions and examples)

UNIT V **LATTICES AND BOOLEAN ALGEBRA** **9+3 Hours**

Partial ordering-Posets-Lattices as Posets- Properties of lattices-Lattices as Algebraic systems –Sub lattices – direct product and Homomorphism-Some Special lattices- Boolean Algebra

Total: 45 + 15 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Modeling Computation and Languages
2. Matrix representation of Graphs

COURSE OUTCOMES: SKILL DEVELOPMENT

After completion of the course, Student will be able to

CO1	Solve problems involving functions, relations and graphs.
CO2	Analyse combinatorics process such as permutation , combination and use them in solving real time engineering problems
CO3	Use mathematical notations and coding theory in solving problems in a systematic and logical manner.
CO4	Understand how to use mathematic to address practical operational issues
CO5	Interpret, and analyze scientific ideas in a logical manner.

References:

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, (2002).
2. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Special Indian edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, (2007).
3. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).
4. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, (2006).
5. Seymour Lipschutz and Mark Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, Second edition, (2007).
6. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
7. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

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1702CS501		OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
			3	0	0	3

PREREQUISITE :

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.

UNIT 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

UNIT II **DESIGN PATTERNS** **9 Hours**

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

UNIT III **APPLYING DESIGN PATTERNS** **9 Hours**

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and 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.

UNIT IV **IMPLEMENTATION AND APPLICATION** **9 Hours**

Mapping design to code – 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

UNIT 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.

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1702CS502	THEORY OF COMPUTATION	L	T	P	C
		3	2	0	4

PREREQUISITE :

1. C Programming.
2. Engineering Mathematics III

COURSE OBJECTIVES:

1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. Enhance/develop students' 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.

UNIT I FINITE AUTOMATA — **9+3Hours**

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.

UNIT II GRAMMARS — **9+3Hours**

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 - Unit productions - Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF.

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

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

UNIT IV TURING MACHINE — **9+3Hours**

Turing Machines- Introduction – Formal definition of Turing machines – Instantaneous descriptions- Turing Machine as Acceptors – Turing Machine as Transducers Computable Languages and functions – Turing Machine constructions – Modifications of Turing Machines.

UNIT V COMPUTATIONAL COMPLEXITY — **9+3Hours**

Undecidability- Basic definitions- Decidable and undecidable problems - Properties of Recursive and Recursively enumerable languages – Introduction to Computational Complexity: Definitions-Time and Space complexity of TMs – complexity classes – introduction to NP-Hardness and NP-Completeness

TOTAL: 45 +15 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

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

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will 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.

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1702CS503	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

PREREQUISITE :

1. Programming in C
2. Programming Paradigms
3. Design and analysis of Algorithms

COURSE OBJECTIVES:

1. To know the Basic devices of graphics
2. To know the algorithm for displaying two dimensional output primitives for raster graphics system
3. To know the basic concepts of how to represent the 3D objects and colour models
4. To know the basic concepts of multimedia and advanced multimedia system concepts

UNIT I BASIC OF COMPUTER GRAPHICS — **7 Hours**

Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards

UNIT II GRAPHICS PRIMITIVES — **9 Hours**

Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

UNIT III 2D TRANSFORMATION AND VIEWING — **10 Hours**

Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping, Color models: properties of light, XYZ, RGB, YIQ and CMY color models

UNIT IV 3D CONCEPTS, TRANSFORMATION AND VIEWING — **10 Hours**

3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces, 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation

UNIT V MULTIMEDIA — **9 Hours**

Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia; Image, video and audio standards. Audio: digital audio, MIDI, processing sound, sampling, compression. Video: MPEG compression standards, compression through spatial and temporal redundancy, inter-frame and intraframe compression. Animation: types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.

Total: 45 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Visible surface detection concepts
2. Back-face detection, depth buffer method, illumination, light sources, illumination methods

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	To understand the various computer graphics hardware and display technologies
CO2	2D and 3D viewing technologies
CO3	Various 2D and 3D objects transformation techniques
CO4	To understand the multimedia concepts for animation
CO5	Design and implement computer animation with morphing

References:

1. Computer Graphics, D.Hearn And P.Baker - Pearson Eduction - C Version
2. Computer Graphics, with OpenGL Hearn and Baker, - Pearson
3. Computer Graphics, Sinha & Udai, - TMH
4. Computer Graphics, Foley and van Dam - Person Education

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1703CS002		SOFTWARE TESTING	L	T	P	C
			3	0	0	3
PREREQUISITE		Software Engineering				
COURSE OBJECTIVES:						
	1.To study the various test design strategies.					
	2. To understand the levels of testing and defect classes.					
	3. To learn the testing and debugging policies .					
	4. To study about quality assurance plan.					

UNIT I	INTRODUCTION	9 Hours

Introduction

Software testing fundamentals- Minimizing Risks – Writing a policy – Building a structured approach – Developing a test strategy – Building the software testing process – Software testing guidelines – Customizing the software testing process.

UNIT II	ORGANIZATION AND DEVELOPMENT OF TESTING APPROACH	9 Hours

Overview of the software testing process – Organizing for testing – Developing Test plan - Profile the software project – Understand project risk – Testing technique – Unit testing and anarysis – Build and Inspect Test Plan.

UNIT III	VERIFICATION AND VALIDATION	9 Hours

Verification Testing – Requirement phase Testing – Design phase testing – Programming phase testing – Test during requirement, Design and Programming Phase – Guidelines – Validation Testing – Build test data – . Execute Results – Record Test Results.

UNIT IV	IMPLEMENTATION	9 Hours

Acceptance Testing and Operational Testing – Acceptance Testing – Define, Develop and Execute – Preoperational Testing – Test and Monitor – Post-Operational Testing – Develop and Test – Post Implementation Analysis – Workbenches – Procedures.

UNIT V	SOFTWARE QUALITY CONSIDERATIONS	9Hours

Quality management – Quality assurance plan- SCM support functions- SCM Tools- Establishing standards – Guidelines- Basic inspection principles- Principles of software defect prevention- Process changes for defect Prevention –Defect prevention considerations.

	Total:	45 Hours

Further Reading:	
	1. The SEI process capability maturity model
	2. Reliability measures

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP	
	After completion of the course, Student will be able to
CO1	Use modern software testing processes in relation to software development and project management.
CO2	Create test strategies and plans, design test cases, prioritize and execute them.
CO3	Identify suitable tests to be carried out. Conduct various types and levels of software testing for a software project
CO4	Experiment with various test processes for quality improvement.
CO5	Identify the software standards for a software project and manage the test process.

References:

1. William E Perry, *Effective Methods for Software Testing*, John Wiley & Sons, USA, 2008
2. Watts S. Humphrey, *Managing the software process*, Addison Wesley, 201
3. Ian Somerville, Software Engineering,, Addison-Wesley, 8th edition, 2006.
4. Steve McConnell, Code Complete, Second Edition, Microsoft Press.
5. Richard E. Fairley, Software Engineering Concepts, McGraw- Hill, 1985
6. https://nptel.ac.in/courses/106/105/106105150/

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1703CS006		MOBILE COMPUTING	L	T	P	C
			3	0	0	3

PREREQUISITE: 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.

UNIT 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.

UNIT 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.

UNIT 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.

UNIT 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.

UNIT 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

CO1	Explain GSM and CDMA Systems.
CO2	Describe Mobile IP, and Mobile TCP
CO3	Understand Databases and Data Dissemination

REFERENCE BOOKS:

1. Jochen H. Schiller,"Mobile Communications," Pearson Education, Second Edition,2004.
2. AsokeTahukder, Roopa Yavagal,"Mobile Computing," Tata McGraw Hill, Second Edition 2010.

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1702CS551	COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE :

1.Programming in C
2. Programming Paradigms

COURSE OBJECTIVES:

1. To explore the various multimedia editing tools like Photoshop/EQV, audacity, Garageband, iMovie and OpenCV
2. To outline the structure media processing tools

List of Experiments:

1. To study the various graphics commands in C language.
2. Develop the DDA Line drawing algorithm using C language
3. Develop the Bresenham's Line drawing algorithm using C language
4. Develop the Bresenham's Circle drawing algorithm using C language
5. Develop the C program for to display different types of lines
6. Perform the following 2D Transformation operation Translation , Rotation and Scaling
7. Perform the Line Clipping Algorithm
8. Perform the Polygone clipping algorithm
9. Procedure to draw the fan blades and to give proper animation using flash
10. Procedure to simulate a ball hitting another ball using flash
11. Procedure to prepare a cover page for the book in your subject area. plan your own design using Photoshop.
12. Design a banner using coral Draw

Total: 45 Hours

Additional Experiments:

1. Basic Graphics games in C language

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

After completion of the course, Student will be able to

CO1	The students should be able to implement small projects using Photoshop and Audacity
CO2	The students should be able to manipulate the images and audio files using Photoshop and Audacity
CO3	Create 3D graphical scenes using open graphics library suits
CO4	Implement image manipulation and enhancement
CO5	Create 2D animations using tools

References:

1. spoken-tutorial.org
2. http://www.cosc.canterbury.ac.nz/people/mukundan/cogr/DDA.html
3. www.doc.ic.ac.uk/~dfg/graphics/GraphicsSlides01.pdf
4. Donald Hearn, Pauline Baker M., "Computer Graphics", 2nd Edition, Prentice Hall, 1994.
5. Tay Vaughan ,"Multimedia", 5th Edition, Tata McGraw Hill, 2001

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1704CS552	CASE TOOLS LABORATORY (MINI PROJECT I)	L	T	P	C
		0	0	2	1

PREREQUISITE :

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 and patterns
9. Draw Component and Deployment diagrams.
10. Practice forward engineering and reverse engineering

TOTAL: 45 HOURS

ADDITIONAL EXPERIMENTS / INNOVATIVE EXPERIMENTS :

1. Exam Registration.
2. Library Management System.

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

REFERENCES:

1. Manual Prepared by the course instructor
2. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2015.
3. http://www.seminarsonly.com/computer%20science/itwin-seminar-report-ppt-pdf.php

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1704CS553	TECHNICAL SEMINAR	L	T	P	C
	SKILL DEVELOPMENT	0	0	2	1

COURSE OBJECTIVES:

1. To develop self-learning skills of utilizing various technical resources to make a technical presentation.
2. To promote the technical presentation and communication skills.
3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. To promote the ability for Interacting and sharing attitude.
5. To encourage the commitment-attitude to complete tasks.

The students are expected to make two presentations on advanced topics (recent trends) related to II year subjects. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as powerpoint presentation and demonstrative models.

TOTAL: 30 HOURS

EVALUATION SCHEME:

Continuous Assessment (100 Marks)

Distribution of Marks for Continuous Assessment	Marks
Presentation I	40
Report	10
Presentation II	40
Report	10
Total	100

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1704GE551	LIFE SKILLS: APTITUDE – 1	L	T	P	C
	SKILL DEVELOPMENT	0	0	2	1

COURSE OBJECTIVES:

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

UNIT 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.

UNIT 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.

UNIT 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.

UNIT 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.

UNIT 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

REFERENCES:

1. Arun Sharma, "How to Prepare for Quantitative Aptitude for the CAT", 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, "How to Prepare for Logical Reasoning for CAT", 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, "A modern approach to Logical reasoning", revised edition, S.Chand publication, 2017.
4. R S Agarwal, "Quantitative Aptitude for Competitive Examinations", revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihnat publication, 2014.

ASSESSMENT PATTERN :

1. Two tests will be conducted (25 * 2) - 50 marks
2. Five assignments will be conducted (5*10) - 50 Marks.

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1701MGX01		PROFESSIONAL ETHICS	L	T	P	C
			3	0	0	3

PREREQUISITE : Basic Understanding of Human Values, Ethical thinking

COURSE OBJECTIVES:

1. To understand Human values, ethical theory, codes of ethics, work place responsibilities and rights.
2. To understand engineering experimentation, global issues and contemporary ethical issues
3. To understand personal ethics, legal ethics, cultural associated ethics and engineer's responsibility.

UNIT I HUMAN VALUES — **9 Hours**

Morals and Ethics - Honesty - Integrity - Values - Work Ethic - Civic Virtue - Respect for Others - Living Peacefully - Caring and Sharing - Self-Confidence - Courage - Co-operation - Commitment - Empathy.

UNIT II ENGINEERING ETHICS AND PROFESSIONALISM — **9 Hours**

Scope of 'Engineering Ethics'- Variety of moral issues - Types of inquiry - Accepting and sharing responsibility - Ethical dilemmas - Moral autonomy - Kohlberg's and Gilligan's theory - Consensus and controversy - Profession and Professionalism - Models of Professional Roles - Right action theories - Senses of corporate responsibility - Codes of ethics: Importance - justification - limitation - Abuse - Sample codes NSPE - IEEE - Institution of Engineers (India).

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION — **9 Hours**

Engineering as experimentation - Engineers as responsible experimenters - Balanced outlook on law - Cautious optimism - Safety and risk - Assessing and reducing risk - Safe exits - The Challenger case study - Bhopal Gas Tragedy - The Three Mile Island and Chernobyl.

UNIT IV WORKPLACE RESPONSIBILITIES AND RIGHTS — **9 Hours**

Fundamental Rights - Responsibilities and Duties of Indian Citizens - Teamwork - Ethical corporate climate - Collegiality and loyalty - Managing conflict - Respect for authority - Collective bargaining - Confidentiality - Conflicts of interest - Occupational crime - Professional rights - Employee rights

UNIT V GLOBAL ISSUES — **9 Hours**

Multinational corporations: Technology transfer and appropriate technology - International rights promoting morally just measures - Environmental ethics: Engineering, ecology - economics - Human and sentient centred - and bio and eco centric ethics - Computer ethics and internet - Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors - Moral leadership.

Total: 45 Hours

Further Reading:

1. Sample code of ethics like IETE, ASME, ASCE, Indian Institute of Materials Management.
2. Virtues for life

COURSE OUTCOMES: SKILL DEVELOPMENT

After completion of the course, Student will be able to

CO1	Articulate engineering ethics theory with sustained lifelong learning to strengthen autonomous engineering decisions.
CO2	Be an example of faith, character and high professional ethics, and cherish the workplace responsibilities, rights of others, public's welfare, health and safety.
CO3	Contribute to shape a better world by taking responsible and ethical actions to improve the environment and the lives of world community.

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1702CS601		WEB TECHNOLOGY	L	T	P	C
			3	2	0	4

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.

UNIT 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.

UNIT 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 – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

UNIT 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 References- Functions- Pattern Matching – File Input and Output – Simple programs in Perl -Using Perl for CGI Programming

UNIT IV **PHP & MySQL** **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 - Database Connectivity. Simple programs in PHP and MySQL.

UNIT V **RAILS & AJAX** **9 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 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.

References:

1. Deitel & Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2016
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 Education ,New Delhi, 2012
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2015
6. Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2014
7. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private Limited, New Delhi, 2015

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1702CS602	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

PREREQUISITE	Data Structures

COURSE OBJECTIVES:

1. To learn problem solving methodologies using Artificial Intelligence
2. To introduce the concepts of machine learning and its implementation
3. To introduce AI programming languages like Prolog

UNIT I	INTRODUCTION	9 Hours

Introduction to AI-Problem formulation, Problem Definition, Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions –Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms-Game Playing

UNIT II	REPRESENTATION OF KNOWLEDGE	9 Hours

Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

UNIT III	KNOWLEDGE INFERENCE	9 Hours

Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory

UNIT IV	PLANNING AND MACHINE LEARNING	9 Hours

Basic plan generation systems - Strips - Planning with state-space search – partial-order planning – planning graphs – Learning from observation - Inductive learning – Decision trees – Explanation based
learning – Statistical Learning methods - Reinforcement Learning

UNIT V	AI PROGRAMMING LANGUAGES	9 Hours

Introduction to Prolog: Introduction To Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages.

Total:	45 Hours

Further Reading:	
	Bot Applications, Deep Learning
COURSE OUTCOMES:	Employability

After completion of the course, Student will be able to

CO1	Experiment with problems those are amenable to solution by AI methods
CO2	Choose appropriate AI methods to solve a given problem
CO3	Formalize the AI problem using proper framework/language
CO4	Implement machine learning algorithms to solve AI problems
CO5	Implement the AI methodologies using AI programming Languages

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. Introduction to Prolog Programming By Carl Townsend.
4. "PROLOG Programming For Artificial Intelligence" -By Ivan Bratko(Addison-Wesley)

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1702CS603	DISTRIBUTED SYSTEMS	L	T	P	C
		3	0	0	3

PREREQUISITE :

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.

UNIT I BASIC CONCEPTS — **9 Hours**

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models– Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles- Internet Protocols.

UNIT II INTERPROCESS COMMUNICATION AND DISTRIBUTED OBJECTS — **9 Hours**

Interprocess Communication – The API for the Internet Protocols – External Data Representation and Marshalling –Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation– Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications.

UNIT 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.

UNIT IV 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-Consensus and related problems.

UNIT 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.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / 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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1703CS012	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	0	3

PREREQUISITE :

1. Database Management Systems
2. Artificial Intelligence(classification & Knowledge Management)

COURSE OBJECTIVES:

1. To understand the concepts of data warehousing with special emphasis on architecture and design.
2. To understand the concepts of data mining
3. To understand the use of Mathematics, Statistics and Information Sciences in discovering knowledge from large databases.

UNIT I DATA WAREHOUSING — **9 Hours**

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation-Data Warehousing to Data Mining

UNIT II INTRODUCTION TO DATA MINING — **9 Hours**

Relation to Statistics, Databases- Data mining on Different Kind of Data – Data Mining Functionalities-Steps in Data Mining Process-Architecture of a Typical Data Mining Systems- Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Database or Data Warehouse System- Major Issues in Data Mining

UNIT III DATA PREPROCESSING AND DATA GENERALIZATION — **9 Hours**

Data Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Attribute Oriented Induction – An Alternative Method for Data Generalization and Concept Description

UNIT IV ASSOCIATION RULES — **9 Hours**

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases, Multi-dimensional Association rules from Relational Databases and Data Ware houses , Association Mining to Correlation analysis.

UNIT V CLASSIFICATION AND CLUSTERING — **9 Hours**

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Rule Based Classification, Other Classification Methods, Prediction, Accuracy and Error Measures, Cluster Analysis, Types of data, Categorization of major clustering methods, Partitioning methods, Hierarchical methods

Total: 45 Hours

Further Reading:

1. Descriptive data summarization
2. Constraint-Based Association Mining

COURSE OUTCOMES: EMPLOYABILITY

After completion of the course, Student will be able to

CO1	Recognize the basics of data warehousing.
CO2	Understand the basic concepts of data mining
CO3	Familiarize the data preprocessing and generalization.
CO4	Know the association rule mining
CO5	Discriminate classification and clustering

References:

1. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, Morgan Kauffman, 2011
2. Margaret H Dunham, Data *Mining: Introductory and Advanced Topics*, Pearson Education 2006
3. Paulraj Ponniah, Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals ,Wiley-India Pvt Ltd, 2006

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1703CS037	WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

3. To impart the new concepts in Web Technologies
4. 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.

UNIT 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.

UNIT 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 – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

UNIT 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 References- Functions- Pattern Matching – File Input and Output – Simple programs in Perl -Using Perl for CGI Programming.

UNIT IV PHP & MySQL — **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 - Database Connectivity. Simple programs in PHP and MySQL.

UNIT V RAILS & AJAX — **9 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 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:

1. Deitel & Deitel, Nieto, Lin, Sadhu, XML How to Program, Pearson Education ,New Delhi, 2016
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 Education ,New Delhi, 2012
5. Achyut S Godbole , Atul Kahate, Web Technologies TCP/IP Architecture and Java Programming, 2nd ed., Tata McGraw Hill Education Private Limited, New Delhi, 2015
6. Pankaj Sharma, Introduction to Web Technology, Katson Books, New Delhi, 2014
7. Bankim Patel, Lal Bihari Barik, Introduction to Web Technology & Internet, Acme Learning Private

1702CS651	WEB TECHNOLOGY LABORATORY	L	T	P	C
		0	0	2	1

PREREQUISITE	Computer Networks
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

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1704CS652		MOBILE APPLICATION DEVELOPMENT LABORATORY	L	T	P	C
		(MINI PROJECT II)	0	0	2	1
PREREQUISITE		Programming Paradigms				
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:	45 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 Conder Sams 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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1704GE651	LIFE SKILLS: APTITUDE II SKILL DEVELOPMENT	L	T	P	C
		0	0	2	1

PREREQUISITE :

Problem Solving techniques

COURSE OBJECTIVES:

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

UNIT I **Partnership, Mixtures and Allegations, Problem on Ages, Simple Interest, Compound Interest** — **6 Hours**

Introduction Partnership - Relation between capitals, Period of investments and Shares- Problems on mixtures - Allegation rule - Problems on Allegation – Problems on ages - Definitions Simple Interest - Problems on interest and amount - Problems when rate of interest and time period are numerically equal - Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.

UNIT II **Blood relations, , Clocks, Calendars** — **6 Hours**

Defining the various relations among the members of a family - Solving Blood Relation puzzles - Solving the problems on Blood Relations using symbols and notations - Finding the angle when the time is given - Finding the time when the angle is known - Relation between Angle, Minutes and Hours - Exceptional cases in clocks - Definition of a Leap Year - Finding the number of Odd days - Framing the year code for centuries - Finding the day of any random calendar date

UNIT III **Time and Distance, Time and Work** — **6 Hours**

Relation between speed, distance and time - Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed - Problems on trains - Problems on boats and streams - Problems on circular tracks - Problems on races - Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method - Problems on alternate days - Problems on Pipes and Cisterns.

UNIT IV **Data Interpretation and Data Sufficiency** — **6 Hours**

Problems on tabular form - Problems on Line Graphs - Problems on Bar Graphs - Problems on Pie Charts - Different models in Data Sufficiency - Problems on data redundancy

UNIT V **Analytical and Critical Reasoning** — **6 Hours**

Problems on Linear arrangement - Problems on Circular arrangement - Problems on Double line-up - Problems on Selections - Problems on Comparisons - Finding the Implications for compound statements - Finding the Negations for compound statements- Problems on assumption - Problems on conclusions - Problems on inferences - Problems on strengthening and weakening of arguments .

Total: 30 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

REFERENCES:

1. Arun Sharma, "How to Prepare for Quantitative Aptitude for the CAT", 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, "How to Prepare for Logical Reasoning for CAT", 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, "A modern approach to Logical reasoning", revised edition, S Chand publication, 2017.

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1704CS653		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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CS6701 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

UNIT I INTRODUCTION & NUMBER THEORY 10

Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

UNIT II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY 10

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. **Public key cryptography:** Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

UNIT III HASH FUNCTIONS AND DIGITAL SIGNATURES 8

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – El Gamal – Schnorr.

UNIT IV SECURITY PRACTICE & SYSTEM SECURITY 8

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

UNIT V E-MAIL, IP & WEB SECURITY 9

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. **IPSecurity:** Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). **Web Security:** SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3-Exportability-Encoding-Secure Electronic Transaction (SET).

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

Upon Completion of the course, the students should be able to:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

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CS6702 GRAPH THEORY AND APPLICATIONS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Be familiar with the most fundamental Graph Theory topics and results.
- Be exposed to the techniques of proofs and analysis.

UNIT I INTRODUCTION 9

Graphs - Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT II TREES, CONNECTIVITY & PLANARITY 9

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

UNIT III MATRICES, COLOURING AND DIRECTED GRAPH 8

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT IV PERMUTATIONS & COMBINATIONS 9

Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

UNIT V GENERATING FUNCTIONS 10

Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

Upon Completion of the course, the students should be able to:

- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- Reason from definitions to construct mathematical proofs.

TEXT BOOKS:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

CS6703 GRID AND CLOUD COMPUTING L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

UNIT I INTRODUCTION 9

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II GRID SERVICES 9

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT III VIRTUALIZATION 9

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL 9

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY 9

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

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TEXT BOOK:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

CS6704 RESOURCE MANAGEMENT TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Be familiar with resource management techniques.
- Learn to solve problems in linear programming and Integer programming.
- Be exposed to CPM and PERT.

UNIT I LINEAR PROGRAMMING 9

Principal components of decision problem – Modeling phases – LP Formulation and graphic solution – Resource allocation problems – Simplex method – Sensitivity analysis.

UNIT II DUALITY AND NETWORKS 9

Definition of dual problem – Primal – Dual relation ships – Dual simplex methods – Post optimality analysis – Transportation and assignment model - Shortest route problem.

UNIT III INTEGER PROGRAMMING 9

Cutting plan algorithm – Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY: 9

Unconstrained external problems, Newton – Ralphson method – Equality constraints – Jacobean methods – Lagrangian method – Kuhn – Tucker conditions – Simple problems.

UNIT V OBJECT SCHEDULING 9

Network diagram representation – Critical path method – Time charts and resource leveling – PERT.

TOTAL: 45 PERIODS

OUTCOMES: SKILL DEVELOPMENT

Upon Completion of the course, the students should be able to:

- Solve optimization problems using simplex method.
- Apply integer programming and linear programming to solve real-life applications.
- Use PERT and CPM for problems in project management

TEXT BOOK:

1. H.A. Taha, "Operation Research", Prentice Hall of India, 2002.

REFERENCES:

1. Paneer Selvam, 'Operations Research', Prentice Hall of India, 2002
2. Anderson 'Quantitative Methods for Business', 8th Edition, Thomson Learning, 2002.
3. Winston 'Operation Research', Thomson Learning, 2003.
4. Vohra, 'Quantitative Techniques in Management', Tata Mc Graw Hill, 2002.
5. Anand Sarma, 'Operation Research', Himalaya Publishing House, 2003.

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18-19

IT6801 SERVICE ORIENTED ARCHITECTURE L T P C 3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn XML fundamentals.
- Be exposed to build applications based on XML.
- Understand the key principles behind SOA.
- Be familiar with the web services technology elements for realizing SOA.
- Learn the various web service standards.

UNIT I INTRODUCTION TO XML 9

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

UNIT II BUILDING XML-BASED APPLICATIONS 9

Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

UNIT III SERVICE ORIENTED ARCHITECTURE 9

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

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography –WS Transactions.

UNIT V BUILDING SOA-BASED APPLICATIONS 9

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines – Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE.

TOTAL : 45 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

Upon successful completion of this course, students will be able to:

- Build applications based on XML.
- Develop web services using technology elements.
- Build SOA-based applications for intra-enterprise and inter-enterprise applications.

TEXTBOOKS:

1. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002.
2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

REFERENCES:

1. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002
2. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005
3. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
4. James McGovern, Sameer Tyagi, Michael E.Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, 2003.

EC6703 EMBEDDED AND REAL TIME SYSTEMS L T P C
3 0 0 3

OBJECTIVES:
The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output-supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs-Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

UNIT V SYSTEM DESIGN TECHNIQUES AND NETWORKS 9

Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY 9

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

OUTCOMES: Employability

Upon completion of the course, students will be able to:

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time applications using embedded-system concepts

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TEXT BOOK:

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

CS6711 SECURITY LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXPERIMENTS:

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
   e) Rail fence – row & Column Transformation
2. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1
5. Implement the SIGNATURE SCHEME - Digital Signature Standard
6. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
7. Setup a honey pot and monitor the honeypot on network (KF Sensor)
8. Installation of rootkits and study about the variety of options
9. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
10. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

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

- Implement the cipher techniques
- Develop the various security algorithms
- Use different open source tools for network security and analysis

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

C / C++ / Java or equivalent compiler

GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

HARDWARE:

Standalone desktops - 30 Nos.

(or)

Server supporting 30 terminals or more.

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CS6712 GRID AND CLOUD COMPUTING LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop

LIST OF EXPERIMENTS:

GRID COMPUTING LAB

Use Globus Toolkit or equivalent and do the following:

1. Develop a new Web Service for Calculator.
2. Develop new OGSA-compliant Web Service.
3. Using Apache Axis develop a Grid Service.
4. Develop applications using Java or C/C++ Grid APIs
5. Develop secured applications using basic security mechanisms available in Globus Toolkit.
6. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING LAB

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. 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.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Write a wordcount program to demonstrate the use of Map and Reduce tasks

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Use the grid and cloud tool kits.
- Design and implement applications on the Grid.
- Design and Implement applications on the Cloud.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

Globus Toolkit or equivalent
Eucalyptus or Open Nebula or equivalent

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CS6801 MULTI-CORE ARCHITECTURES AND PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the challenges in parallel and multi-threaded programming.
- Learn about the various parallel programming paradigms, and solutions.

UNIT I MULTI-CORE PROCESSORS 9

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks - Symmetric and Distributed Shared Memory Architectures – Cache coherence - Performance Issues – Parallel program design.

UNIT II PARALLEL PROGRAM CHALLENGES 9

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).

UNIT III SHARED MEMORY PROGRAMMING WITH OpenMP 9

OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs - Library functions – Handling Data and Functional Parallelism – Handling Loops - Performance Considerations.

UNIT IV DISTRIBUTED MEMORY PROGRAMMING WITH MPI 9

MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation

UNIT V PARALLEL PROGRAM DEVELOPMENT 9

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Program Parallel Processors.
- Develop programs using OpenMP and MPI.
- Compare and contrast programming for serial processors and programming for parallel processors.

TEXT BOOKS:

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 (unit 2)

REFERENCES:

1. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.
2. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.

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CS6010 SOCIAL NETWORK ANALYSIS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities.
- Learn visualization of social networks.

UNIT I INTRODUCTION 9

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

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 PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behaviour 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 VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

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 PERIODS

OUTCOMES: EMPLOYABILITY

Upon completion of the course, the student should be able to:

- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks.

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MG6088 **SOFTWARE PROJECT MANAGEMENT** L T P C
3 0 0 3

OBJECTIVES:

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL 9

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

- At the end of the course the students will be able to practice Project Management principles while developing a software.

TEXTBOOK:

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

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CS6811 **PROJECT WORK** L T P C
0 0 12 6

EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

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 PERIODS

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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