1701MA101	ENGINEERING MATHEMATICS I	L	T	P	C
	(Common to all B.E / B.Tech Degree Programmes)	3	2	0	4

SKILL DEVELOPMENT

COURSE OBJECTIVES:

1. To educate Matrix Algebra Technique and curvature Theory
2. To impart knowledge of Techniques in solving Ordinary Differential Equations and to apply in solving Modern Engineering Problems
3. To acquaint the students about functions of several variables and also to familiarize the students in infinite series and their convergence

UNIT I EIGEN VALUE PROBLEMS — **9 Hours**

Characteristic equation - Eigen values and Eigen vectors of a real matrix – Properties - Cayley– Hamilton theorem- Diagonalization of Matrices - Reduction of a quadratic form to a canonical form by orthogonal transformation – Application of Matrices in Structural Engineering and image processing

UNIT II ORDINARY DIFFERENTIAL EQUATIONS — **9 Hours**

Higher order linear differential equations with constant coefficients – Cauchy's and Legendre's linear equations – Method of variation of parameters in solution of ordinary differential equations.

UNIT III DIFFERENTIATION AND GEOMETRICAL APPLICATIONS — **9 Hours**

Derivative of special functions (Trigonometry, Exponential, Logarithmic), Derivative by rule (Product, Quotient, Chain rule), Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature- Evolutes and involutes.

UNIT IV MULTIVARIABLE CALCULUS — **9 Hours**

Functions of two variables and solutions(Partial derivatives and Euler's theorem)– Taylor's series - Maxima and Minima – Application of Partial Derivatives to find the optimum requirement using Lagrangian multipliers.

UNIT V SEQUENCES AND SERIES — **9 Hours**

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Application of Sequences in real life.

TOTAL: 45 + 15 HOURS

FURTHER READING:

1. Modeling and solutions using Newton's Law of Cooling of Bodies
2. Differentiation of implicit Functions, Jacobians and Properties

COURSE OUTCOMES: SKILL DEVELOPMENT

On the Successful completion of the course, Students will be able to

CO1: Analyze the characteristics of a linear system with Eigen value and Eigen Vectors.
CO2: Recognize and solve Higher order Ordinary Differential Equations
CO3: Solve Derivative of special functions and apply it in solving Geometrical problems
CO4: Apply Partial Derivatives in finding Maxima and Minima of a function
CO5: Test the convergence of any series

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REFERENCES:

1. Veerarajan R., "Engineering Mathematics", updated second edition for semester I and II,(2017)
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, (2014).
3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Sixth edition, Laxmi Publications(p) Ltd.,(2014).
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
5. P.Kandasamy, K. Gunavathy and K. Thilagavathy, Engineering Mathematics ,Volume II, S. Chand & Co ., New Delhi, (2009)
6. Erwin Kreyszig, Advanced Engineering Mathematics,9th Edition, Wiley International edition, (2006)
7. Ramana B.V, "Higher Engineering Mathematics",Tata McGrawHill Publishing, New Delhi, (2007).
8. M K Venkataraman, Engineering mathematics, Volume I, 2nd ed., National Publishing Co.(2003)
9. nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html
10. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.htm

1701PH101	APPLIED PHYSICS FOR ENGINEERS	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	3	0	0	3

COURSE OBJECTIVES:

1. To impart knowledge in properties of matter, crystallography and ultrasonics.
2. To understand the applications of lasers and fiber optics.
3. To implement the principles of quantum physics in the respective engineering fields.

UNIT I PROPERTIES OF MATTER **9 Hours**

Elasticity: elastic and plastic materials – Hooke's law – elastic behavior of a material – stress – strain diagram – factors affecting elasticity. Three moduli of elasticity – Poisson's ratio – torsional pendulum – twisting couple on a cylinder. Young's modulus – uniform bending – non-uniform bending. Viscosity: coefficient of viscosity – streamline and turbulent flow – experimental determination of viscosity of a liquid – Poiseuille's method.

UNIT II APPLIED OPTICS **9 Hours**

Interference: air wedge – theory – uses – testing of flat surfaces – thickness of a thin wire. Laser: introduction – principle of laser – characteristics of laser light– types: CO2 laser – semiconductor laser (homojunction). Fiber optics: principle of light transmission through fiber – expression for acceptance angle and numerical aperture – types of optical fibers (refractive index profile and modes) – fiber optic communication system (block diagram & description).

UNIT III ULTRASONICS **9 Hours**

Ultrasonics: introduction – properties of ultrasonic waves – generation of ultrasonic waves – magnetostriction - piezo electric methods – detection of ultrasonic waves – Determination of velocity of ultrasonic waves (acoustic grating). Applications of ultrasonic waves: pulse echo method, SONAR – measurement of velocity of blood flow – modes of operation (A scan, B Scan & C Scan).

UNIT IV SOLID STATE PHYSICS **9 Hours**

Crystal Physics: lattice – unit cell – crystal systems – Bravais lattices – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per unit cell, atomic radius, coordination number and determination of packing density for SC, BCC, FCC and HCP structures – X-ray diffraction: Laue's method – powder crystal method.

UNIT V QUANTUM MECHANICS **9 Hours**

Quantum Physics: development of quantum theory – de Broglie wavelength – Schrodinger's wave equation – time dependent and time independent wave equations – physical significance. Application: particle in a box (1D) – degenerate and non-degenerate states. Electron Microscopy-SEM, TEM - principle and working – problem solving.

TOTAL: 45 HOURS

FURTHER READING:

Neutrino's – expanding universe

COURSE OUTCOMES: Skill Development

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

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.

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1701CH101	APPLIED CHEMISTRY IN INFORMATICS (Common to B.E. CSE & B.Tech. IT Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

1. Recall the terminologies of electrochemistry and explain the function of batteries and fuel cells.
2. Choose appropriate instrumentation technique for interpreting analytical data.
3. Understand the fundamentals of corrosion, its types and polymers with its applications with its electrochemical reactions.

UNIT I ELECTROCHEMISTRY **9 Hours**

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

UNIT II CORROSION AND ITS CONTROL **9 Hours**

Corrosion – types-chemical, electrochemical corrosion (galvanic, differential aeration) - factors influencing corrosion -corrosion control – material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. protective coatings: electroplating of gold and electroless plating of nickel, paints - constituents and functions.

UNIT III NONCONVENTIONAL ENERGY RESOURCES AND STORAGE DEVICES **9 Hours**

Introduction- nuclear energy- nuclear fission, nuclear fusion- nuclear chain reactions- breeder reactor- Nuclear Reactor-solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery nickel- cadmium battery- lithium battery- fuel cell H2 -O2 fuel cell- applications

UNIT IV POLYMER AND ITS APPLICATION **9 Hours**

Introduction. Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Addition (Free Radical Mechanism) condensation and copolymerization. Fabrication of Plastics. Application –Conducting polymer.

UNIT V CHEM-INFORMATICS **9 Hours**

Definition – coordinate – Bonds - Bond length - Bond angles - Torsional angles -Polypeptide conformation and representation by Ramachandran map — Chemical structure — Conformation –Representation of structural information – Linear format - SMILEYS notation – MOL format – PDB format – Storage of structural data in a data base –Canonical structure – Similarity search – Sub structure search - Structural keys – Finger print - molecular data base-Cambridge structural database (protein data bank)-noting data bank-Application of chem-informatics in drugs designing.

TOTAL: 45 HOURS

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FURTHER READING:

1. Alloys-ferrous and nonferrous alloys
2. Cambridge structural database (protein data bank)-noting data bank
3. Unique properties of nano material- introduction to quantum materials, quantum dots, supramolecular materials and molecular crystal engineering- molecular machines and devices-Logic gate using electronics material for molecular electronics

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1: Construct an electrochemical cell and measure its potential
CO2: Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications
CO3: Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes
CO4: Differentiate the polymers used in day to day life based on its source, properties and applications
CO5: Identify the applications of analytical methods for the estimation of elements in aqueous media

REFERENCES:

1. Ashima Srivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi, 2010.
2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai,

1701EN101 **TECHNICAL ENGLISH** L T P C

(Common to all B.E / B.Tech Degree Programmes) 3 0 0 3

COURSE OBJECTIVES:

1. To develop the ability to read and comprehend technical texts in the field of Engineering
2. To develop vocabulary building through the study of word construction
3. To develop ability to write formal definitions of technical terms and expression.
4. To recognize various grammatical structures that will aid the student improve his/her theoretical knowledge.

UNIT I **9 Hours**

Articles-Preposition-Subject-Verb-Object-Adjective-Adverb-Conjunction-Nouns- Usages of Have, has, had-Simple Present-Simple Past-Simple Future-Self introduction-Framing Questions

UNIT II **9 Hours**

Present Continuous-Past Continuous-Future Continuous-Describing a place, person or thing-Framing negative questions-Gerund-Listening to Articles, speeches and audios

UNIT III **9 Hours**

Present perfect-past perfect-future perfect-writing short paragraph-sentence pattern- Infinitive-Tag questions-Reading newspaper cutting

UNIT IV **9 Hours**

Present perfect continuous –Past perfect continuous-Future perfect continuous-writing an Essay in 100 words-Types of sentences-Prefix-suffix-word formation-Dialogue writing.

UNIT V **9 Hours**

Active voice-passive voice-impersonal passive voice –Synonyms and Antonyms-phrasal verbs- Punctuation-Common Errors-Letter writing.

TOTAL: 45 HOURS

FURTHER READING:

Letters from a Father to His Daughter- Jawaharlal Nehru

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1: Read and comprehend technical texts in the field of Engineering

CO2: Acquire vocabulary building and write effectively in technical writing

CO3: Write formal definitions of technical terms and expression in both verbal and written form.

CO4: Understand grammatical structures and use flawless English in the professional documents

REFERENCES:

1. Meenakshi Raman, Sangeetha Sharma, "***Technical Communication : English Skills for Engineers***" Oxford University Press: New Delhi, 2016.
2. Rizvi Ashrav.M, "***Effective Technical Communication***" Tata McGraw Hill: New Delhi, 2017
3. Herbert, A.J, "***Structure of Technical English***", London English Language Society. https://archive.org/details/in.ernet.dli.2015.136456
4. J.D. O'Connor, Better ***English Pronunciation*** Paperback, 2nd edition, 162 pages, Published September 16th 2013 by Cambridge University Press,October 23rd 1967
5. Nehru, Jawaharlal. ***Letters from a Father to His Daughter***, Puffin Books, 2004
6. ***Technical English*** by faculty of English –published by EGS Pillay press 2017

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1701GEX01 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING** L T P C 3 0 0 3

(Common to B.E. / B.Tech. – CSE, IT, CIVIL & MECH)

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

UNIT I DC AND AC CIRCUIT FUNDAMENTALS **9 Hours**

Definition of terms - voltage, current, power, energy, active and passive elements; Ohm's law and Kirchhoff's laws; Series and parallel circuits; source transformation; equivalent resistance; star/delta conversion; Concepts of AC circuits - RMS and average values, form and peak factors, real and reactive power, power factor.

UNIT II THREE PHASE SYSTEM **9 Hours**

Introduction to three phase circuits; balanced and unbalanced system; phase and line parameters - relations; power measurement -voltmeter and ammeter method, two and three watt meter methods; Components of AC transmission and distributions systems (single line diagram approach).

UNIT III ELECTRICAL MACHINES AND POWER PLANTS **9 Hours**

Operating principle, classification and applications of DC generator, DC motor, transformer and induction motor (single phase); Power plants - Thermal power plant, hydroelectric power plant and nuclear power plant (Block diagram approach only).

UNIT IV SEMICONDUCTOR DEVICES AND TRANSDUCERS **9 Hours**

Characteristics of PN junction diode and zener diode; Rectifiers- Half wave and full wave rectifiers (qualitative treatment only); BJT – configurations; Amplifiers & Oscillators - definition, classification and applications; Transducers – classification, resistance temperature detector (RTD), linear variable differential transformer (LVDT).

UNIT V DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS **9 Hours**

Boolean algebra - Reduction of Boolean expressions; De-Morgan's theorem; Logic gates - Implementation of Boolean expressions; 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.

TOTAL: 45 HOURS

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FURTHER READING:

1. Working principle and operation of Fax and ISDN
2. LED lightings

COURSE OUTCOMES: 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

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, New Delhi, 2004.
4. J.B.Gupta, "Fundamentals of Electrical Engineering and Electronics", S K Kataria and Sons, Reprint 2012 Edition.

1701GEX02	ENGINEERING GRAPHICS	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	2	2	0	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.

CONCEPTS AND CONVENTIONS (Not for Examination) 2 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.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 10 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, Scales: Construction of Diagonal and Vernier scales.

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

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 10 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.

UNIT III PROJECTION OF SOLIDS 10 Hours

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

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 10 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. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 10 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.

COMPUTER AIDED DRAFTING (Demonstration Only) 8 Hours

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

FURTHER READING:

Applications of engineering graphics in students' discipline

TOTAL: 60 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, Bangalore, 2007.
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.

1701GEX03	PROGRAMMING IN C	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	3	0	0	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

UNIT I BASIC CONCEPTS 8 Hours

Organization and Classifications of Computer- Generations of Computers- Number System- Problem Solving Techniques – Algorithm Design– Flowchart–Pseudocode

UNIT II INTRODUCTION TO C LANGUAGE 10 Hours

Overview of C - Constants, Variables and Data Types- Compilation and Linking - Operators and Expressions- Decision Making and Branching – Looping statements

UNIT III ARRAYS AND STRINGS 9 Hours

Arrays-One Dimensional Array- Declaration and Initialization-Two Dimensional Array-Declaration and Initialization- Programs using Arrays- Strings- String Handling Functions, Programs using Strings- Managing I/O Operations

UNIT IV FUNCTIONS & STRUCTURES 10 Hours

Functions-Function Prototypes-Declaring, Defining and Calling Functions-Call by value and Call by Reference-Recursive Functions-Structures- Declaration and Definition -Accessing Structure Members-Arrays of Structures-Unions- Programs using Structures and Unions

UNIT V POINTERS & FILES 8 Hours

Pointers-Dynamic Memory Allocation-Arithmetic Operations using Pointers, Files – File Manipulation-I/O Operations, Preprocessor Directives, Storage Classes

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. E. Balagurusamy,"Programming in ANSI C", McGraw Hill Education India Private Limited; Seventh Edition, 2017.
2. Pradip Dey, Manas Ghosh , "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.

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1701HS151	PHYSICS AND CHEMISTRY LABORATORY-I (Common to all B.E. / B.Tech Degree Programmes)	L 0	T 0	P 2	C 1

COURSE OBJECTIVES:

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies
2. To achieve perfectness in experimental skills
3. To bring confidence and ability to develop and fabricate engineering and technical equipments.
4. To train the students to analyses the water sample
5. To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis

PHYSICS

LIST OF EXPERIMENTS:

1. Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).
2. Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate the Young's modulus of the material by uniform bending.
3. Determine the coefficient of viscosity of the given liquid by Poiseulle's method
4. From the interference fringes from the air wedge setup and calculate the thickness of the given wire.
5. By applying the principle of diffraction, determine the wavelength of given laser light and the average particle size of lycopodium powder using laser source.
6. Determine the
   (i) Wavelength of ultrasonic in a liquid medium
   (ii) Velocity of ultrasonic waves in the given liquid
   (iii) Compressibility of the given liquid using ultrasonic interferometer.

CHEMISTRY

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 viscometry method
7. Conductometric titration of strong acid Vs strong Base

TOTAL: 45 HOURS

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COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1: Realize the concept of properties of matter and apply the same for practical applications.
CO2: Identify the suitable laser source for fiber optic communication applications.
CO3: Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4: Classify the different types of crystal structures and analyze their properties.
CO5: Comprehend the efficacy of quantum equations in modern areas.
CO6: Identify the pH of the solution.
CO7: Find the iron content of the water sample using potentiometer.
CO8: Explain and demonstrate the conductance of the solution.
CO9: Interpret the hardness and metal ions present in the water.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd, 2013.
7. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New Yor (2001).

1701GEX51	PROGRAMMING IN C LABORATARY	L	T	P	C
	(Common to all B.E. / B.Tech. Degree Programmes)	0	0	2	1

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.

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: 30 HOURS

ADDITIONAL EXPERIMENTS:

1. Write a c program to remove the occurrence of "the" word from entered string.
2. Create two files test1.txt and test2.txt and write a C program to read the file text1.txt character by character on the screen and paste it at the end of test2.txt

COURSE OUTCOMES: EMPLOYABILITY

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

CO1: Understand basic concepts of computers
CO2: Implement basic concepts of c-language
CO3: Implement arrays, strings and pointers.
CO4: Implement the basics of structures, unions, file management and preprocessor in C language

REFERENCES:

1. E. Balagurusamy,"Programming in ANSI C", McGraw Hill Education India Private Limited; Seventh Edition, 2017.
2. Pradip Dey, Manas Ghosh , "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
3. Ashok N. Kamthane, "Programming in C", Pearson Education India, 3rd Edition, 2015.
4. Yashavant P. Kanetkar, "Let Us C", BPB Publications, 15th Revised and Updated Edition, 2016.
5. http://nptel.ac.in/

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1701MA201	ENGINEERING MATHEMATICS II	L	T	P	C
	(Common to all B.E / B.Tech Degree Programmes)	3	2	0	4

COURSE OBJECTIVES:

1. To develop an understanding of the standard techniques of Complex variable theory to apply in areas such as heat conduction, elasticity, fluid Dynamics and flow of electric current
2. To train the students with the concepts of Vector calculus needed for problems in all Engineering Disciplines
3. To make the Students apply Laplace Transform to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I ANALYTIC FUNCTIONS **9 Hours**

Analytic functions – Cauchy Riemann Equations – Properties – Determination of Analytic function using Milne Thomson's method, Conformal Mappings – Mappings of w= z + a, az, 1/z – Bilinear Transformation – Application of Analytic Functions.

UNIT II COMPLEX INTEGRATION **9 Hours**

Cauchy's fundamental theorem (statement only) – Application of Cauchy's Integral formula – Laurent's series – Classification of singularities – Cauchy's Residue theorem (statement only) – Contour integration.

UNIT III MULTIPLE INTEGRAL **9 Hours**

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.

UNIT IV VECTOR CALCULUS **9 Hours**

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration: Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Applications of the above theorems to find surface area of a closed region and volume of cube and parallel piped.

UNIT V LAPLACE TRANSFORM **9 Hours**

Laplace Transform – Conditions for existence – Transform of Elementary Functions – Basic Properties – Transform of Unit step function and Impulse function – Transform of Periodic function – Inverse Laplace Transform – Convolution Theorem (excluding Proof) – Initial and Final value Theorems – Solution of Linear ODE of Second order with constant coefficient using Laplace Transform techniques.

TOTAL: 45 + 15 HOURS

FURTHER READING:

1. Volume of Cylindrical and spherical polar co ordinates.
2. Application of Integral theorems in finding Volume/Area of Hemispheres, cylinders etc.

COURSE OUTCOMES: SKILL DEVELOPMENT

On the Successful completion of the course, Students will be able to

CO1: Construct Analytic functions and trace the image of a region using transformation.
CO2: Solve complex integrals.
CO3: Apply multiple integral technique to find area and volume.
CO4: Compute surface and volume integral in vector field.
CO5: Apply Laplace Transform in solving Boundary value problems of second order ODE.

REFERENCES:

1. Veerarajan R., "Engineering Mathematics", updated second edition for Semester I and II, 2017.
2. Grewal. B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publications, Delhi, 2014.
3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Sixth edition, Laxmi

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1701PH201	PHYSICS OF ENGINEERING MATERIALS	L	T	P	C
	(Common to B.E. CSE & B.Tech. IT Programmes)	3	0	0	3

COURSE OBJECTIVES:

1. To understand the physical properties of conductors, semiconductors and superconductors.
2. To recognize the basic principle of interaction of light with matter and working of optical devices.
3. To classify the types of dielectric, magnetic materials and polarization mechanisms with their properties.

UNIT I CONDUCTING AND SUPERCONDUCTING MATERIALS 9 Hours

Electrical and thermal conductivity of metals – Wiedemann Franz law – band theory of metals – density of states. Superconductors: properties – types – High Tc superconductors – applications.

UNIT II SEMICONDUCTORS 9 Hours

Elemental and compound semiconductors – intrinsic semiconductors: carrier concentration – electrical conductivity – band gap. Extrinsic semiconductors: carrier concentration – variation of Fermi level. Hall effect: theory and experimental determination – applications: Solar cells.

UNIT III DIELECTRIC MATERIALS 9 Hours

Types of polarization: electronic, ionic, orientation and space charge polarization mechanisms – langevin – Debye equation – frequency and temperature effects on polarization – dielectric strength and loss – dielectric breakdown mechanisms – active dielectric materials: pizo, pyro and ferroelectricity – applications.

UNIT IV OPTICAL MATERIALS 9 Hours

Interaction of light with materials – optical absorption – transmission – Luminescence in solids – Fluorescence and Phosphorescence – Optical band gap – LED, LCD.

UNIT V MAGNETIC MATERIALS 9 Hours

Classification and properties – domain theory – hard and soft magnetic materials – anti-ferro and ferri magnetic materials – applications: magnetic recording and memories.

TOTAL: 45 HOURS

FURTHER READING:

1. Photonic crystals - LIFI

COURSE OUTCOMES: SKILL DEVELOPMENT

On the Successful completion of the course, Students will be able to

CO1: Exemplify the physical properties of conductors, superconductors and semiconductors with applications.
CO2: Identify the suitable semiconducting material for solar cell applications.
CO3: Select the suitable materials for insulating and dielectric applications.
CO4: Compare the optical properties of display devices.
CO5: Analyze the properties of magnetic materials for practical applications.

REFERENCES:

1. Saxena, Gupta, Mandal, Solid State Physics, Pragati Prakashan Educational Publishers, 13th revised edition, Meerut, India, 2013.
2. M.N. Avadhanulu and P.G.Kshirsagar, A Text Book of Engineering Physics, S.Chand & Company Ltd, New Delhi, 2011.
3. S.O.Pillai, Solid State Physics, New Age International Publications, New Delhi, 2010.
4. M.A. Wahab, N.K. Mehta, Solid State physics – structure and properties of materials, Narosa publishing house Pvt. Ltd, 6th edition, 2010.
5. Semiconductor Physics and Devices, Donald A. Neamen, Mc Graw-Hill, 2011.
6. P.K. Palanisamy, Materials Science, Scitech Publications India Pvt.Ltd, 2014.

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1701CH201	ENVIRONMENTAL STUDIES	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	3	0	0	3

SKILL DEVELOPMENT

COURSE OBJECTIVES:

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

UNIT I ECOSYSTEMS AND BIODIVERSITY **10 Hours**

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

UNIT II NATURAL RESOURCES **10 Hours**

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

UNIT III ENVIRONMENTAL POLLUTION **9 Hours**

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

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **8 Hours**

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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **8 Hours**

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

TOTAL: 45 HOURS

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1701GE201	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
	(Common to B.E. / B.Tech. – CSE, ECE & IT)	3	0	0	3

COURSE OBJECTIVES:

1. To impart basic knowledge on Civil and Mechanical Engineering.
2. To explain the materials used for the construction of civilized structures.
3. To understand the fundamentals of construction of structure.
4. To explain the component of power plant units and detailed explanation to IC engines their working principles.
5. To explain the R & AC system.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS — 9 Hours

Surveying: Objects – types – classification – principles.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections

UNIT II BUILDING COMPONENTS AND STRUCTURES — 9 Hours

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring –plastering – Mechanics – Internal and external forces – stress – strain – elasticity.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING AND PUMPS — 9 Hours

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV IC ENGINES — 9 Hours

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM — 9 Hours

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL: 45 HOURS

FURTHER READING:

1. Mechanics of solids.
2. Structural Design.
3. Thermal Engineering, Fluid mechanics, Heat and mass transfer.

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT

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

CO1: Explain the survey and usage of construction material and proper selection of construction materials.
CO2: Know about the building structures.
CO3: Identify the components of power plant.
CO4: Demonstrate working principles of petrol and diesel engine.
CO5: Explain the components of refrigeration and air conditioning.

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REFERENCES:

1. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd., New Delhi, 1999.
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, 2005.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam.

1702CS201 **PROGRAMMING IN C++**

(Common to B.E. CSE & B.Tech. IT Programmes)

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

1. To understand the concepts of Object Oriented Programming.
2. To execute the Object oriented concepts to solve problems using C++
3. To develop programs using files and templates.

UNIT I BASIC CONCEPTS **8 Hours**

Object Oriented Paradigm – Elements of Object Oriented Programming – Merits and Demerits of Object oriented Methodology – C++ fundamentals – Data types, Operators and Expressions, Control flow, Arrays – Implementing ADT in the base language.

UNIT II CLASS AND OBJECTS **10 Hours**

Classes and Objects – Passing objects as arguments – returning objects – Friend functions – Static data and member functions – Constructors – Parameterized Constructor – Destructor – Copy constructor – Array of objects – pointer to object members.

UNIT III POLYMORPHISM AND INHERITANCE **9 Hours**

Polymorphism – Function overloading – Unary operator overloading – Binary operator overloading – Data conversion – Overloading with Friend Functions. Inheritance – Derived Class – Abstract Classes – Types of Inheritance – Iterators and Containers.

UNIT IV VIRTUAL FUNCTIONS AND TEMPLATES **10 Hours**

Virtual functions – Pure virtual functions – Virtual Destructors – RTTI – Typeid – Dynamic casting – Cross casting – Down casting – Template – Class template, Function Template, Generic programming, Standard Template Library.

UNIT V FILES AND EXCEPTION HANDLING **8 Hours**

C++ streams – console streams – console stream classes – formatted and unformatted console I/O operations – Manipulators File streams classes – File modes – File pointers and Manipulations – File I/O – Exception Handling – Try-Catch-Throw Paradigm – Exception specifications – Terminate and unexpected functions – Uncaught Exception.

TOTAL: 45 HOURS

FURTHER READING:

Object Oriented Approach in Java Programming

COURSE OUTCOMES: EMPLOYABILITY

On the Successful completion of the course, Students will be able to

CO1: Explore the concept of classes and objects.
CO2: Develop programs using arrays and strings.
CO3: Implement the various types of inheritance.
CO4: Exemplify the concepts of functions and streams.
CO5: Develop programs using files, templates and exception handling.

REFERENCES:

1. K.R.Venugopal, Rajkumar Buyya, and T.Ravishankar, "Mastering C++", MaGraw Hill Education, 2nd Edition, 2017.
2. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, fourth edition, 2013
3. E.Balagurusamy, "Object Oriented Programming with C++", MaGraw Hill Education, 5th Edition, 2017.
4. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications Pvt. Ltd., Third Edition, 1999.
5. Ira Pohl, "Object oriented programming using C++", 2nd Edition, Pearson Education, Reprint 2004.
6. http://nptel.ac.in/

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1701GEX52 **COMMUNICATION SKILLS LAB** L T P C
(Common to all B.E. / B.Tech Degree Programmes) 0 0 2 1

COURSE OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

LIST OF EXPERIMENTS: The following course content to conduct the activities is prescribed for the Communication Skills Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** - General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, 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/ 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.
5. **Activities on Group Discussion and Interview 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.

TOTAL: 30 HOURS

ADDITIONAL EXPERIMENTS:

Phonetics

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1: Accomplishment of sound vocabulary and its proper use contextually.
CO2: Flair in Writing and felicity in written expression
CO3: Enhanced job prospects.
CO4: Effective Speaking Abilities.

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REFERENCES:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson, 2007. Cengage Learning pvt. Ltd. New Delhi
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw Hill 2009.
7. Books on TOFEL/ GRE/ GMAT/ CAT/ IELTS by Barron's/ DELTA/ Cambridge University Press.

1701GEX53	WORKSHOP PRACTICE	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	0	0	2	1

COURSE OBJECTIVES:

1. To provide hands on training for fabrication of components using sheet metal and welding equipment / tools.
2. To develop skill for using carpentry and fitting tools to make simple components and metal joints.
3. To provide hands on training for preparing the green sand mould using foundry tools.
4. To provide training for making simple house hold electrical & pipe line connections using suitable tools.
5. To develop the skill to make / operate/utilize the simple engineering components.

LIST OF EXPERIMENTS

1. Forming of simple object in sheet metal using suitable tools (Example: Dust Pan / Soap Box) (or) making simple object using Metal Spinning Machine. (Example: Aluminum Cup). — 4 Hours
2. Prepare V (or) Half round (or) Square (or) Dovetail joint from the given mild Steel flat. — 4 Hours
3. Fabrication of a simple component using thin and thick plates. (Example: Book rack) — 2 Hours
4. Making a simple component using carpentry power tools. (Example: Electrical switch Box/Tool box/ Letter box. — 2 Hours
5. Construct a household pipe line connections using pipes, Tee joint, Four way joint, elbow, union, bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump using pipes, bend, gate valve, flanges and foot valve. — 4 Hours
6. Prepare a green sand mould using solid pattern/split pattern. — 4 Hours
7. Study of gas welding equipment and its demonstration — 2 Hours
8. Soldering Practice for simple printed circuit board. — 4 Hours
9. Construct a domestic electrical wire connections using indicator, one way switch with calling bell, two way switch with lamp, one way switch with fan regulator and one way switch with socket. — 4 Hours

TOTAL: 30 HOURS

COURSE OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT

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

CO1: Fabricate simple components using sheet metal & welding equipment/tools.
CO2: Make simple components / joints using carpentry and fitting tools.
CO3: Prepare green sand mould using suitable tools.
CO4: Make simple house hold electrical & pipe line connections using suitable tools.
CO5: Make / operate / utilize the simple engineering components.

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1701HS251	PHYSICS AND CHEMISTRY LABORATORY-II	L	T	P	C
	(Common to all B.E. / B.Tech Degree Programmes)	0	0	2	1

COURSE OBJECTIVES:

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
2. To achieve perfectness in experimental skills.
3. To bring confidence and ability to develop and fabricate engineering and technical equipments.
4. To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

PHYSICS

LIST OF EXPERIMENTS:

1. Using lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.
2. Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.
3. With the aid of spectrometer, find the angle of Prism and refractive index of the medium.
4. Determine the wavelengths of polychromatic source in the visible region using spectrometer grating.
5. Find the depression at the midpoint of the given wooden beam subjected to non-uniform bending and determines the Young's modulus of the material of the beam.
6. Find the given unknown resistance using Carey-Foster's Bridge.

CHEMISTRY

LIST OF EXPERIMENTS:

1. Conductometric Precipitation titration of $BaCl_2$ Vs Na_2SO_4
2. Estimation of dissolved oxygen in a water sample/sewage by Winklers method.
3. Estimation of chloride content in water by argentometric method.
4. Conductometric titration of mixture of acids.
5. Comparison of alkalinities of the given water samples.

Additional Experiments:

1. Estimation of heavy metals in the given solution by EDTA method.
2. Determination of concentration of unknown colored solution using spectrophotometer.

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TOTAL: 30 HOURS

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1 :	Realize the concept of properties of matter and apply the same for practical applications.
CO2 :	Identify the suitable laser source for fiber optic communication applications.
CO3 :	Determine the velocity of ultrasonic waves and apply the same for day today applications.
CO4 :	Classify the different types of crystal structures and analyze their properties.
CO5 :	Comprehend the efficacy of quantum equations in modern areas.
CO6 :	Illustrate the EMF of the Redox reaction.
CO7 :	Compare the Alkalinity of given water Sample with their standards.
CO8 :	Identify the Concentration of metal ion present in water sample.
CO9 :	Outline the precipitation titration using Conductivity meter.
CO10:	Interpret the dissolved oxygen present in the water.

REFERENCES:

1. D.S.Mathur, Elements of Properties of matter, 5th edition, S.Chand & Company Ltd., New Delhi,2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, Concepts of Modern Physics, 6th edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New

1702CS251	PROGRAMMING IN C++ LAB (Common to B.E. CSE & B.Tech. IT Programmes)	L 0	T 0	P 2	C 1

COURSE OBJECTIVES:

1. To understand the concepts of Object Oriented Programming.
2. To execute the Object oriented concepts to solve problems using C++
3. To develop programs using files and templates.

LIST OF EXPERIMENTS:

1. Write a C++ program to implement operator overloading with class and objects.
2. Write a C++ program to implement types of Inheritance.
3. Write a C++ program to implement two different classes for adding a private data member using friend function.
4. Write a C++ program to implement operator and function overloading.
5. Write a C++ program to implement file handling operations.
6. Write a C++ program to implement Class templates and Function templates.
7. Write a C++ program to implement exception handling.

Additional Experiments:

1. Write a C ++ program to perform complex number subtraction by overloading an operator using friend function.
2. Write a C ++ program to perform quick sort using function template.

TOTAL: 30 HOURS

COURSE OUTCOMES: SKILL DEVELOPMENT

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

CO1 : Implement the concept of classes and objects.
CO2 : Develop programs using arrays and strings.
CO3 : Implement the various types of inheritance.
CO4 : Exemplify the concepts of functions and streams.

REFERENCES:

1. K.R.Venugopal, Rajkumar Buyya, and T.Ravishankar, "Mastering C++", MaGraw Hill Education, 2nd Edition, 2017.
2. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, fourth edition, 2013
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4. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications Pvt. Ltd., Third Edition, 1999.
5. Ira Pohl, "Object oriented programming using C++", 2nd Edition, Pearson Education, Reprint 2004.
6. http://nptel.ac.in/

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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
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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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MA6566 DISCRETE MATHEMATICS L T P C
3 1 0 4

OBJECTIVES:

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

UNIT I LOGIC AND PROOFS 9+3

Propositional Logic – Propositional equivalences - Predicates and Quantifiers – Nested Quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II COMBINATORICS 9+3

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

UNIT III GRAPHS 9+3

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES 9+3

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 9+3

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 (L: 45+T:15): 60 PERIODS

OUTCOMES: SKILL DEVELOPMENT

At the end of the course, students would:

- Have knowledge of the concepts needed to test the logic of a program.
- Have an understanding in identifying structures on many levels.
- Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
- Be aware of the counting principles.
- Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

TEXT BOOKS:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 7th Edition, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata Mc Graw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

1. Ralph.P.Grimaldi., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.
2. Thomas Koshy., "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Seymour Lipschutz and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata Mc Graw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

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CS6501 **INTERNET PROGRAMMING** L T P C
3 1 0 4

OBJECTIVES:

The student should be made to:

- Learn Java Programming.
- Understand different Internet Technologies.
- Be exposed to java specific web services architecture.

UNIT I **JAVA PROGRAMMING** 9

An overview of Java – Data Types – Variables and Arrays – Operators – Control Statements – Classes – Objects – Methods – Inheritance - Packages – Abstract classes – Interfaces and Inner classes – Exception handling - Introduction to Threads – Multithreading – String handling – Streams and I/O – Applets.

UNIT II **WEBSITES BASICS, HTML 5, CSS 3, WEB 2.0** 8

Web 2.0: Basics-RIA Rich Internet Applications - Collaborations tools - **Understanding websites and web servers:** Understanding Internet – Difference between websites and web server- Internet technologies Overview –Understanding the difference between internet and intranet; **HTML and CSS:** HTML 5.0 , XHTML, CSS 3.

UNIT III **CLIENT SIDE AND SERVER SIDE PROGRAMMING** 11

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript. **Servlets:** Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server;- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - **JSP:** Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSP code.

UNIT IV **PHP and XML** 8

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Connecting to Database – Using Cookies-Regular Expressions; **XML:** Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

UNIT V **INTRODUCTION TO AJAX and WEB SERVICES** 9

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; **Web Services:** Introduction- Java web services Basics – Creating, Publishing ,Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application – SOAP.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

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

- Implement Java programs.
- Create a basic website using HTML and Cascading Style Sheets.
- Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
- Design rich client presentation using AJAX.
- Design and implement simple web page in PHP, and to present data in XML format.
- Design and implement server side programs using Servlets and JSP.

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CS6502 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the basics of OO analysis and design skills.
- Learn the UML design diagrams.
- Learn to map design to code.
- Be exposed to the various testing techniques.

UNIT I UML DIAGRAMS 9

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

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller - Design Patterns – creational - factory method - structural – Bridge – Adapter - behavioral – Strategy – observer.

UNIT III CASE STUDY 9

Case study – the Next Gen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization - Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies - Aggregation and Composition.

UNIT IV APPLYING DESIGN PATTERNS 9

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns.

UNIT V CODING AND TESTING 9

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

TOTAL: 45 PERIODS

EMPLOYABILITY

OUTCOMES:

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

- Design and implement projects using OO concepts.
- Use the UML analysis and design diagrams.
- Apply appropriate design patterns.
- Create code from design.
- Compare and contrast various testing techniques.

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TEXT BOOK:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

REFERENCES:

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.

CS6503 THEORY OF COMPUTATION L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.
- Be aware of Decidability and Un-decidability of various problems.
- Learn types of grammars.

UNIT I FINITE AUTOMATA 9

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

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

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 MACHINES 9

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

UNIT V UNSOLVABLE PROBLEMS AND COMPUTABLE FUNCTIONS 9

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

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Design Finite State Machine, Pushdown Automata, and Turing Machine.
- Explain the Decidability or Undecidability of various problems

TEXT BOOKS:

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

CS6504 COMPUTER GRAPHICS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Gain knowledge about graphics hardware devices and software used.
- Understand the two dimensional graphics and their transformations.
- Understand the three dimensional graphics and their transformations.
- Appreciate illumination and color models.
- Be familiar with understand clipping techniques.

UNIT I INTRODUCTION 9

Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

UNIT II TWO DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

UNIT III THREE DIMENSIONAL GRAPHICS 10

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT IV ILLUMINATION AND COLOUR MODELS 7

Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive colour concepts - RGB colour model - YIQ colour model - CMY colour model - HSV colour model - HLS colour model; Colour selection.

UNIT V ANIMATIONS & REALISM 10

ANIMATION GRAPHICS: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening. **COMPUTER GRAPHICS REALISM:** Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

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

- Design two dimensional graphics.
- Apply two dimensional transformations.
- Design three dimensional graphics.
- Apply three dimensional transformations.
- Apply Illumination and color models.

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CS6511 **CASE TOOLS LABORATORY** L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Learn the basics of OO analysis and design skills.
- Be exposed to the UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques

LIST OF EXPERIMNENTS:

To develop a mini-project by following the 9 exercises listed below.

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System
14. Library Management System
15. Student Information System

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Design and implement projects using OO concepts.
- Use the UML analysis and design diagrams.
- Apply appropriate design patterns.
- Create code from design.
- Compare and contrast various testing techniques

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CS6512 INTERNET PROGRAMMING LABORATORY L T P C
0 0 3 2

EMPLOYABILITY

OBJECTIVES:
The student should be made to:

- Be familiar with Web page design using HTML/XML and style sheets
- Be exposed to creation of user interfaces using Java frames and applets.
- Learn to create dynamic web pages using server side scripting.
- Learn to write Client Server applications.
- Be familiar with the frameworks JSP Strut, Hibernate, Spring
- Be exposed to creating applications with AJAX

LIST OF EXPERIMNENTS:
IMPLEMENT THE FOLLOWING:

WEBPAGE CONCEPTS

a) Create a web page with the following using HTML
   a. To embed a map in a web page
   b. To fix the hot spots in that map
   c. Show all the related information when the hot spots are clicked.
b) Create a web page with the following.
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets. Use our college information for the web pages.

c) Create and save an XML document at the server, which contains 10 users information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.

SOCKETS & SERVLETS

a) Write programs in Java using sockets to implement the following:
   I. HTTP request
   II. FTP
   III. SMTP
   IV. POP3
b) Write a program in Java for creating simple chat application with datagram sockets and datagram packets.
c) Write programs in Java using Servlets:
   I. To invoke servlets from HTML forms

   II. To invoke servlets from Applets
d) Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
e) Write a program to lock servlet itself to a particular server IP address and port number. It requires an init parameter key that is appropriate for its servlet IP address and port before it unlocks itself and handles a request
f) Session tracking using hidden form fields and Session tracking for a hit count
g) Install TOMCAT web server. Convert the static webpages of programs 1&2 into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user Id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

ADVANCE CONCEPTS:

a) Implement a simple program using following frameworks
   a. JSP Struts Framework b. Hibernate c. Spring
b) Explore the following application in AJAX: Searching in real time with live searches, Getting the answer with auto complete, Chatting with friends ,Dragging and dropping with Ajax, Getting instant login feedback, Ajax-enabled popup menus, Modifying Web pages on the fly.
c) Write a web services ,for finding what people think by asking 500 people's opinion for any consumer product
d) Write a web services for predicting for any product sales

TOTAL: 45 PERIODS

OUTCOMES:

CS6513 COMPUTER GRAPHICS LABORATORY L T P C

0 0 3 2

OBJECTIVES:

The student should be made to:

- Understand graphics programming
- Be exposed to creation of 3D graphical scenes using open graphics library suits
- Be familiar with image manipulation, enhancement
- Learn to create animations
- To create a multimedia presentation/Game/Project.

60

LIST OF EXPERIMENTS:

IMPLEMENT THE EXERCISES USING C / OPENGL / JAVA

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – all slopes
   Circle (Midpoint)
2. 2D Geometric transformations –
   Translation
   Rotation Scaling
   Reflection Shear
   Window-Viewport
3. Composite 2D Transformations
4. Line Clipping
5. 3D Transformations - Translation, Rotation, Scaling.
6. 3D Projections – Parallel, Perspective.
7. Creating 3D Scenes.
8. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization.
9. 2D Animation – To create Interactive animation using any authoring tool.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY / ENTREPRENEURSHIP

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

- Create 3D graphical scenes using open graphics library suits
- Implement image manipulation and enhancement
- Create 2D animations using tools

REFERENCE:

spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE

C, C++, Java, OpenGL

HARDWARE:

Standalone desktops - 30 Nos.

(or)

Server supporting 30 terminals or more.

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CS6601 DISTRIBUTED SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand foundations of Distributed Systems.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in studying process and resource management.

61

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UNIT I INTRODUCTION

Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. **Case study:** World Wide Web.

UNIT II COMMUNICATION IN DISTRIBUTED SYSTEM 10

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. **Network virtualization:** Overlay networks. **Case study:** MPI **Remote Method Invocation And Objects:** Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. **Case study:** Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: Enterprise Java Beans -from objects to components.

UNIT III PEER TO PEER SERVICES AND FILE SYSTEM 10

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. **Overlay case studies:** Pastry, Tapestry- Distributed File Systems –Introduction - File service architecture – Andrew File system. **File System:** Features-File model -File accessing models - File sharing semantics **Naming:** Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

UNIT IV SYNCHRONIZATION AND REPLICATION 9

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

UNIT V PROCESS & RESOURCE MANAGEMENT 9

Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. **Resource Management:** Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Discuss trends in Distributed Systems.
- Apply network virtualization.
- Apply remote method invocation and objects.
- Design process and resource management systems.

IT6601 MOBILE COMPUTING L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the basic concepts of mobile computing
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

UNIT I INTRODUCTION 9

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT III MOBILE TELECOMMUNICATION SYSTEM 9

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT IV MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Explain the basics of mobile telecommunication system
- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Use simulator tools and design Ad hoc networks
- Develop a mobile application.

TEXT BOOK:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.

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CS6660 COMPILER DESIGN L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the design principles of a Compiler.
- Learn the various parsing techniques and different levels of translation
- Learn how to optimize and effectively generate machine codes

UNIT I INTRODUCTION TO COMPILERS 5

Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.

UNIT II LEXICAL ANALYSIS 9

Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

UNIT III SYNTAX ANALYSIS 10

Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item-Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .

UNIT IV SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT 12

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

RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.

UNIT V CODE OPTIMIZATION AND CODE GENERATION 9

Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Design and implement a prototype compiler.
- Apply the various optimization techniques.
- Use the different compiler construction tools.

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TEXTBOOK:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007.

IT6502 **DIGITAL SIGNAL PROCESSING** L T P C
3 1 0 4

OBJECTIVES:

- To introduce discrete Fourier transform and its applications.
- To teach the design of infinite and finite impulse response filters for filtering undesired signals.
- To introduce signal processing concepts in systems having more than one sampling frequency.

UNIT I SIGNALS AND SYSTEMS 9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

UNIT II FREQUENCY TRANSFORMATIONS 9

Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT III IIR FILTER DESIGN 9

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

UNIT IV FIR FILTER DESIGN 9

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques

UNIT V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS 9

Binary fixed point and floating point number representations – Comparison - Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Perform frequency transforms for the signals.
- Design IIR and FIR filters.
- Finite word length effects in digital filters

TEXT BOOK:

1. John G. Proakis and Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education, Prentice Hall, 2007.

CS6611 MOBILE APPLICATION DEVELOPMENT LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.

67

5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

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

- Design and Implement various mobile applications using emulators.
- Deploy applications to hand-held devices

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers - 30 Nos.

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CS6659 ARTIFICIAL INTELLIGENCE L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of Expert Systems and machine learning.

UNIT I INTRODUCTION TO AI AND PRODUCTION SYSTEMS 9

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- 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.

UNIT II REPRESENTATION OF KNOWLEDGE 9

Game playing - 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

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

Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

UNIT V EXPERT SYSTEMS 9

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

TOTAL: 45 PERIODS

OUTCOMES: ENPLOYABILITY

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

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalise a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

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TEXT BOOKS:

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008. (Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

IT6702 DATA WAREHOUSING AND DATA MINING L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Be familiar with the concepts of data warehouse and data mining,
- Be acquainted with the tools and techniques used for Knowledge Discovery in Databases.

UNIT I DATA WAREHOUSING 9

Data warehousing Components –Building a Data warehouse — Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II BUSINESS ANALYSIS 9

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III DATA MINING 9

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV ASSOCIATION RULE MINING AND CLASSIFICATION 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V CLUSTERING AND TRENDS IN DATA MINING 9

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TOTAL: 45 PERIODS

OUTCOMES: EMPLOYABILITY

After completing this course, the student will be able to:

- Apply data mining techniques and methods to large data sets.
- Use data mining tools
- Compare and contrast the various classifiers.

TEXT BOOKS:

1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

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CS6612 COMPILER LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

LIST OF EXPERIMENTS:

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

TOTAL: 45 PERIODS

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OUTCOMES: EMPLOYABILITY

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

- Implement the different Phases of compiler using tools
- Analyze the control flow and data flow of a typical program
- Optimize a given program
- Generate an assembly language program equivalent to a source language program

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ compiler and Compiler writing tools 30 Nos.

GE6674 COMMUNICATION AND SOFT SKILLS- LABORATORY BASED L T P C
0 0 4 2

EMPLOYABILITY / SKILL DEVELOPMENT

OBJECTIVES:

To enable learners to,

- Develop their communicative competence in English with specific reference to speaking and listening
- Enhance their ability to communicate effectively in interviews.
- Strengthen their prospects of success in competitive examinations.

UNIT I LISTENING AND SPEAKING SKILLS 12

Conversational skills (formal and informal)- group discussion- making effective presentations using computers, listening/watching interviews conversations, documentaries. Listening to lectures, discussions from TV/ Radio/ Podcast.

UNIT II READING AND WRITING SKILLS 12

Reading different genres of tests ranging from newspapers to creative writing. Writing job applications- cover letter- resume- emails- letters- memos- reports. Writing abstracts- summaries- interpreting visual texts.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS 12

International English Language Testing System (IELTS) - Test of English as a Foreign Language (TOEFL) - Civil Service(Language related)- Verbal Ability.

UNIT IV INTERVIEW SKILLS 12

Different types of Interview format- answering questions- offering information- mock interviews-body language(paralinguistic features)- articulation of sounds- intonation.

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UNIT V SOFT SKILLS 12

Motivation- emotional intelligence-Multiple intelligences, emotional intelligence- managing changes-time management-stress management-leadership straits-team work- career planning - intercultural communication- creative and critical thinking

TOTAL: 60 PERIODS

Teaching Methods:

1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class.

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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