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

Aim of the course:

- To familiarize the students with differential calculus.
- To develop the use of integration techniques that is needed by engineers for practical applications.
- To familiarize the student with concepts of matrices. This is needed in many branches of engineering.
- To make the students understand the idea of vector spaces and linear transformations.
- To acquaint the student appreciate the purpose of using transforms to create a new domain of the matrix.

PREREQUISITES: BASIC MATHEMATICS

Module 1: Differntial Calculus

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

Module 2: Integral Calculus

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

Module 3: Linear Algebra

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

Module 4: Vector Spaces

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

Module 5: Matrices

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

Total Hours: 60

COURSE OUTCOMES Skill Development

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

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

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

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

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

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

REFERENCES BOOKS:

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2018.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

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1901CH104 APPLIED CHEMISTRY IN INFORMATICS (for CSE&IT)

L	T	P	C
3	0	0	3

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

PREREQUISITES: BASIC CHEMISTRY 9

MODULE I CELL CHEMISTRY

hours

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

9 hours

MODULE II MATERIALS FOR COMPUTERS

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

9 Hours

MODULE III NANOTECHNOLOGY

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

9 Hours

MODULE IV POLYMERS

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

9 Hours

MODULE V CHEMINFORMATICS

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

Total: 45 Hours

COURSE OUTCOMES Skill Development

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

CO1: Describe electrode potential concepts using electro chemical principles

CO2: Illustrate the semiconductor materials and its importance

CO3: Classify the nano materials used for different purposes

CO4: Describe the various polymer materials and its formation

CO5: Discuss the different chemoinformtics tools used

REFERENCE:

1. Jain and Jain, "Engineering Chemistry", Sixteenth edition, Dhanpatrai publications, 2012.
2. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.
3. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New 2015.
4. Kannan P. and Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.Chennai, 2009
5. Peter Atkins and Julio de Paula, "Physical Chemistry", VII Edition, Oxford University Press, New York, 2002
6. https://www.electrical4u.com/classification-of-electrical-conducting-material
7. https://en.wikipedia.org/wiki/Ramachandran lot
8. Wiki online sources

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PROGRAMMING FOR PROBLEM SOLVING
(Common for all B.E./B.Tech Programme)

L	T	P	C
3	0	0	3

1901GEX03

COURSE OBJECTIVES:

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

MODULE I INTODUCTION TO PROGRAMMING **9 Hours**

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

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

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

MODULE III ARRAYS AND STRINGS **9 Hours**

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

MODULE IV FUNCTIONS AND POINTERS **9 Hours**

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

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

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

TOTAL: 45 HOURS

FURTHER READING:

Object Oriented Programming Approach.

COURSE OUTCOMES: Employability

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

CO1: Describe basic concepts of computers
CO2: Paraphrase the operations of number system
CO3: Describe about basic concepts of C-Language
CO4: Understand the code reusability with the help of user defined functions
CO5: Analyze the structure concept, union, file management and preprocessor in C language

REFERENCES:

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

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

1901GEX03

COURSE OBJECTIVES:

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

MODULE I INTODUCTION TO PROGRAMMING **9 Hours**

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

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

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

MODULE III ARRAYS AND STRINGS **9 Hours**

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

MODULE IV FUNCTIONS AND POINTERS **9 Hours**

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

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

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

TOTAL: 45 HOURS

FURTHER READING:

Object Oriented Programming Approach.

COURSE OUTCOMES: Employability

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

CO1: Describe basic concepts of computers
CO2: Paraphrase the operations of number system
CO3: Describe about basic concepts of C-Language
CO4: Understand the code reusability with the help of user defined functions
CO5: Analyze the structure concept, union, file management and preprocessor in C language

REFERENCES:

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

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1901ENX01	ENGLISH FOR ENGINEERS (Common for all B.E./B.Tech. Programme)	L	T	P	C
		2	0	0	2

Course Overview:

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

Course Objectives:

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

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

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

MODULE II LISTENING SKILLS **9 Hours**

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

MODULE III SPEAKING SKILLS **9 Hours**

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

MODULE IV READING SKILLS **9 Hours**

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

MODULE V WRITING SKILLS **9 Hours**

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

TOTAL: 45 HOURS

Skill Development

Course Outcomes (COs):

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

CO1: Compose grammatically correct sentences for oral as well as written communication.
CO2: Interpret perfectly after paying attention to an audio on any theme.
CO3: Organize formal presentations effectively.
CO4: Explain the content of any written or visual material.
CO5: Generate technical and non-technical documents with appropriate contents and context.
CO6: Monitor, analyze and adjust their own communication.

REFERENCES:

1. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication: Principles and Practice", Oxford University Press, New Delhi, 2011.
2. Rizvi and Ashraf M., "Effective Technical Communication", Tata McGraw-Hill, New Delhi, 2005.
3. G. Radhakrishna Pillai, "English for Success", Central Institute of English and Foreign Languages", Emerald Publishers ,Hyderabad, 2003

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4. Jones, D, "The Pronunciation of English", CUP, . Cambridge,2002.

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

Skill Development, Employability

List of Experiments:

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

Total: 45 Hours

References:

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

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

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

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

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

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

MODULE III CAREER PLANNING **6 Hours**

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

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

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

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

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

TOTAL: 30 HOURS

Skill Development

Course Outcomes:

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

CO1: Apply their knowledge and skill to engineering field
CO2: Understand the value of individual competence
CO3: Apply their skill to career planning and team work
CO4: Illustrate verbal and non verbal skills
CO5: Use various communication skill exercise to write and interpret the contents

REFERENCES:

1. Dr.P.Prasad(2012) "The Functional Aspects of COMMUNICATION SKILLS";fifth Edition;S.K Kataria &Sons Publication
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.
3. Aruna Koneru (2008) "Professional Communication"; Second edition; Tata McGraw-Hill Publishing Ltd.

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

Skill Development, Employability

List of Experiments:

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

Total: 45 Hours

References:

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

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		L	T	P	C
1901IISX51	**COMMUNICATION SKILLS LAB (Common for all B.E./B.Tech. Programme)**	0	0	2	1

Course Overview:

English- being the foremost global language has its domination in internationally sensitive domains such as science and technology, business and commercial relation, education and diplomatic relationships, politics and administration and so on. It is the language of corporate India, a passport for better career, better pay, and advanced knowledge and for communication with the entire world. In higher education, English is the prevalent prestigious language. Careers in any area of business communication or within the government, or in science and technology require fluency in English The basic idea behind offering English as a practical subject at the undergraduate level is to acquaint students with a language that enjoys currency as a lingua franca of the globe. For prospective engineers nothing could be more useful or productive than being able to reach out to the world of technology. In the ELCS lab the students are trained in Communicative English Skills, phonetics, word accent, word stress, rhythm and intonation, making effective oral presentations - both extempore and Prepared-seminars, group discussions, presenting techniques of writing, role play, telephonic skills, asking and giving directions, information transfer , debates, description of person, place, objects etc; . The lab encourages students to work in a group, engage in peer-reviews and inculcate team spirit through various exercises on grammar, vocabulary, listening and pronunciation games, etc

Objectives :

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To help the students to cultivate the habit of reading passages from the computer monitor, thus provides them the required facility to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.
- To train them to face interviews with confidence and enable them to prepare resume with cover letter.
- To prepare them to use communicative language and participate in public speaking.
- To initiate them into greater use of the computer in power point presentation preparation, report Writing and e-mail writing etc.
- To initiate them into greater use of the computer in power point presentation preparation, report Writing and e-mail writing etc.
- To expose the Students to participate in group discussions, debates with ease.

List of Exercises :

I Activities on Fundamentals of Listening and Inter-personal Communication — **6 Hours**

Listening to conversation, listening to technical presentation- listening to online video conferencing ,interviews and webinars -starting a conversation - responding appropriately and relevantly - using appropriate body language - Role Play in different situations & Discourse

II Activities on Reading Comprehension — **6 Hours**

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

III Activities on Writing Skills — **6 Hours**

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

IV Activities on Presentation Skills — **6 Hours**

Oral presentations (individual and group) through JAM sessions – presentation on online platform (webinars, online meeting) - seminars -PPTs and written presentations through posters- projects- report- e-mails- assignments etc.- creative and critical thinking.

V Activities on Soft Skills **6 Hours**

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

TOTAL: 30 HOURS

Course Outcomes (COs): Skill Development

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

CO1: Compose grammatically correct sentences for oral as well as written communication.
CO2: Interpret perfectly after paying attention to an audio on any theme.
CO3: Organize formal presentations effectively.
CO4: Explain the content of any written or visual material.
CO5: Generate technical and non-technical documents with appropriate contents and context.
CO6: Monitor, analyse and adjust their own communication.

REFERENCES:

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

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

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

PREREQUISITES: Statistics and Probability

COURSE CONTENTS

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

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

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

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

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

Total Hours: 60

COURSE OUTCOMES: Skill Development

Upon completion of this course, students will be able to

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

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

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

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

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

REFERENCES BOOKS:

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

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

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

MODULE I ELECTRONIC MATERIALS **9 Hours**

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

MODULE II SEMICONDUCTORS **9 Hours**

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

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

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

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

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

MODULE V NANO DEVICES **9 Hours**

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

TOTAL: 45 HOURS

COURSE OUTCOMES: Skill Development

Upon completion of this course, students will be able to

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

REFERENCES:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.

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

COURSE OBJECTIVES:

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

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

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

MODULEII ELECTRICAL MACHINES **6 Hours**

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

MODULEIII MEASURING INSTRUMENTS **6 Hours**

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

MODULEIV SEMICONDUCTOR DEVICES **7 Hours**

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

MODULEV DIGITAL SYSTEMS **6 Hours**

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

MODULEVI COMMUNICATION SYSTEMS **6 Hours**

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

MODULEVII ELECTRICAL SAFETY AND WIRING **7 Hours**

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

TOTAL: 45 HOURS

COURSE OUTCOMES: Employability

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

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4. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics", S.K. Kataria and Sons, Reprint 2012 Edition.
5. R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson, 11th Edition, 2013.
6. George Kennedy and Bernard Davis, "Kennedy"s Electronic communication Systems", McGraw Hill Education, 5th Edition, 2011.
7. Donald P. Leach, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", McGraw-Hill Education, 8th Edition, 2014.

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

COURSE OBJECTIVES:

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

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

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

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

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

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

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

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

MODULEIV PROJECTION OF SOLIDS **9 Hours**

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

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

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

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

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

TOTAL: 45+5 HOURS

COURSE OUTCOMES: Skill Development

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

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

REFERENCES:

1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore,2016.

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2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2015.
4. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2017.
5. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2016.

1901GE201	ENGINEERING EXPLORATION	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating ill-defined problems.
- Undergo several design challenges and work towards the final design challenge
- **Apply Design Thinking on the following Streams to**
  Project Stream 1: Electronics, Robotics, IOT and Sensors
  Project Stream 2: Computer Science and IT Applications
  Project Stream 3: Mechanical and Electrical tools
  Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

Skill Development

HOW TO PURSUE THE PROJECT WORK?

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

TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task 3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

Task 4: Empathizing

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:

- Final Report Submission and Presentation

- **Method of Evaluation: Same as Mini project category. Project exhibition may be conducted.**

REFERENCES:

1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)
3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:

1. Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
2. Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
3. Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
4. Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

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

Employability, Entrepreneurship

List of Experiment

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

TOTAL: 30 HOURS

REFERENCES:

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

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

Prerequisite: Engineering Intelligence - I

MODULE I VOCABULARY BULIDING — **6 Hours**

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

MODULEII COMMUNICATION WORKSHOP — **6 Hours**

Story Telling- Newspaper Reading-Extempore.

MODULEIII INTERPERSONAL SKILLS — **6 Hours**

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

MODULEIV LEADERSHIP& EMPLOYABILITY SKILLS — **6 Hours**

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

MODULE V RESUME BUILDING — **6 Hours**

Importance of Resume- Resume Preparation - introducing onself

TOTAL: 30 HOURS

Skill Development

Course Outcomes:

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

CO1: Understand various vocabulary building activites

CO2: Use various communication skill workshop for reading and writing.

CO3: Apply interpersonal skill to motivate creating and innovating skills

CO4: Apply various leadership and employability skill to get career opportunities

CO5: Prepare resume with necessary components

REFERENCES:

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

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

List of Experiments: Employability, Entrepreneurship

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

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

Total: 30 Hours

References:

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

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

List of Experiments: Skill Development

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

Total: 30 Hours

References:

1. Edward Hughes, " Electrical Technology,", Pearson Education
2. D.P. Kothari and Nagrath" Basic Electronics",MH Education 2013.
3. Paul Scherz and Simon Monk "Practical Electronics for inventors" Mc Graw Hill Publications 2013.

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

List of Experiments: Skill Development, Employability

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

Total: 30 Hours

References:

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

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1901MA302	ENGINEERING MATHEMATICS – III (Queuing Model and Network Model) (Common to CSE & IT)	L	T	P	C
		3	2	0	4

Skill Development

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.

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 QUEUEING MODELS **12 Hours**

Characteristics of Queuing Models – Markovian Queues – (M / M / 1): (FIFO / ∞ /∞),(M / M / 1): (FIFO / N / ∞),(M / M / C): (FIFO / ∞ / ∞),(M / M / C): (FIFO / N / ∞)models – Little"s formulae.

UNIT IV NETWORK MODEL **12 Hours**

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

UNIT V TRANSPORTATION AND ASSIGNMENT MODELS **12 Hours**

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

TOTAL: 60 HOURS

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.Gross.D and Harris C.M, "Fundamentals of Queuing Theory", Wiley Student Edition, 2004.

4. Robertazzi, "Computer Networks and Systems: Queuing Theory and performance Evaluation", Springer, 3rd Edition, 2006

5.TahaH.A."Operations Research", Pearson education, Asia, 8th Edition, 2007

6.Trivedhi K.S, "Probability and statistics with Reliability, queuing and Computer Science Applications", John Wiley and Sons, 2nd Edition, 2002

7. Kalavathy S, Operations Research, Second Edition, Vikas Publishing House, 2004.

8.nptel.ac.in/courses/111105035, www.nptelvideos.in/2012/11/Mathematics.html

9. www.learnerstv.com/Free-maths-video lectures - ltv348-page1.html

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	2. Study the various algorithms and analysis methods 3. Use various data structures and algorithms techniques for real time examples	9 Hours
UNIT I	INTRODUCTION	
Data Structures – Programming Strategies – ADT – Algorithms – Problem Solving – Complexity – Asymptotic Notations – Recurrence Relations		9 Hours
UNIT II	DATA STRUCTURES	
Array – List: Types, Applications, Linked List – Stack: Operations, Applications, Implementations – Queue: Operations, Applications, Implementations – Tree: Types, Implementation, Applications		9 Hours
UNIT III	DIVIDE AND CONQUER & DYNAMIC PROGRAMMING	
Divide and Conquer techniques with Algorithm Analysis – Merge Sort – Optimal Binary Search Tree, Huffman Tree – Strassen's Matrix Multiplications. Dynamic Programming with Algorithm Analysis – Graph – Warshall's, Floyd' Algorithms – Binomial Coefficient		9 Hours
UNIT IV	GREEDY AND ITERATIVE METHODS	
Prim's Algorithm – Kruskal's Algorithms – Dijikstra's Algorithms – The stable Marriage Problem – Algorithm Analysis		9 Hours
UNIT V	ALGORITHM ANALYSIS AND APPLICATIONS	
Algorithm Analysis and power – P,NP,NP-Complete Problems – Backtracking – N-Queen Problem, Graph Coloring – Branch and Bound –Decision Tree - Travelling Salesman Problem – Knapsack Problem		
	TOTAL:	45 HOURS

FURTHER READING / SEMINAR :

1. Decision Tree Approach,
2. Networking problems

COURSE OUTCOMES: Employability

After completion of the course, Student will be able to

CO1	Understand the concepts of Data structures and Algorithms
CO2	Explain various data structures
CO3	Apply Divide and Conquer & Dynamic programming method to solve different problems
CO4	Apply Greedy and Iterative method to solve different problems
CO5	Analysis various algorithms using various types and methods

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2014
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction toAlgorithms", Second Edition, Mcgraw Hill, 2012.
3. Reema Thareja, "Data Structures Using C", Oxford University Press, 2012
4. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,2012
5. Michael T Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 8th Edition, Wiley Publishers, 2014.
6. nptel.ac.in/

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			L	T	P	C
19021T351		DATA STRUCTURES AND ALGORITHMS LAB	0	0	2	1

PREREQUISITE : Programming using C

LIST OF EXPERIMENTS:

MODULE 1: Skill Development

1. Implement Array ADT
2. Write the program to perform Linked List, Stack and Queue Operations
3. Write the program to implement Tree Traversal operations
4. Write the program to implement sorting operations
5. Write the program to implement searching operations

MODULE 2: Employability 1. Implement Tower of Honoi Problem using recursion 2. Implement Fibonacci number generation using recursion 3. Implement minimum spanning tree using Prim's, Kruskal's Algorithms 4. Write program to implement all the functions of a dictionary (ADT) using hashing. 5. Given the sequence of integers 5 9 1 7 4 3 2 0 manually arrange this sequence in ascending order using the three "'elementary"' sorting methods: insertion sort, bubblesort and selection sort, showing at each step the new configuration of the sequence. How many comparisons and how many element moves were used by each method? Which is the best performing method for sorting this array of integers? Which would be the worst arrangement of this sequence?	
Hardware: Standalone desktops 30 Nos **Software:** Turbo C++ compiler or equivalent	**TOTAL: 30 HOURS**

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1902IT302	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

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**

Introduction, Technologies for building Processors and Memory, Performance, The Power Wall,Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsignednumbers, Representing Instructions in the Computer, Logical Operations, Instructions for MakingDecisions, Supporting Procedures in Computer Hardware, Communicating with People.

Unit II	**PROCESSING UNIT**	**9 Hours**

MIPS Addressing for 32-Bit Immediate and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Sub word Parallelism, Real Stuff: Streaming SIMD Extensions and Advanced Vector Extensions in x86.

Unit III	**PIPELINING**	**9 Hours**

Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, Real Stuff: The ARM Cortex – A8 and Intel Core i7 Pipelines, Going Faster: Instruction –Level Parallelism and Matrix Multiply. An Introduction to Digital Design Using a Hardware Design Language to Describe and Model a Pipeline.

Unit IV	**MEMORY**	**9 Hours**

Memory Technologies, the Basics of Caches, Measuring and Improving Cache Performance, dependable memory hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite- State Machine to Control a Simple Cache, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers, Real Stuff: The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies, Going Faster: Cache Blocking and Matrix Multiply.

Unit V	**DISK STORAGE**	**9 Hours**

Disk Storage and Dependability-RAID levels-hardware multi threading-clusters- message passingmultiprocessors-Multiprocessors network topologies.

	TOTAL:	**45 Hours**

Further Reading:	1. Introduction to Multi Core Programming 2. Working principles of Intel and AMD Processor
Course Outcomes:	After completion of the course, Student will be able to Skill Development
	CO1: Understand the concepts of structure of computers and machine instructions
	CO2: Explain the concepts of processing units
	CO3: Design and analyze pipelined control units
	CO4: Evaluate performance of memory systems
	CO5: Understand disk storage and apply RAID concepts in real time problems

References:

1. David A. Patterson and John L. Hennessey, "Computer organization and design, The Hardware/Software interface", Morgan Kauffman / Elsevier, Fifth edition, 2014.

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2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, Tata McGraw Hill, 2013.
3. William Stallings, —Computer Organization and Architecture – Designing for Performancel, Sixth Edition, Pearson Education, 2013.
4. V.P. Heuring, H.F. Jordan, —Computer Systems Design and Architecturel, Second Edition, Pearson Education, 2015.
5. Behrooz Parhami, —Computer Architecturel, Oxford University Press, 2012.
6. http://nptel.ac.in

19021T303		DIGITAL PRINCIPLES AND DESIGN	L	T	P	C
			3	0	0	3

AIM: This is to provide the concepts of Digital principles, logic, conversion and design procedures

COURSE OBJECTIVES:

Learn how to design digital circuits, by simplifying the Boolean functions. Also, gives an ideaabout designs using PLDs, and writing codes for designing larger digital systems.

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

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC — **9 Hours**

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers and Demultiplexers – Introduction to HDL – HDL Models of Combinational circuits.

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC — **9 Hours**

Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC — **9 Hours**

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards

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

RAM and ROM – Memory Decoding – Error Detection and Correction – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.

TOTAL: 45 HOURS

FURTHER READING / SEMINAR :

1. Decision Tree Approach
2. Networking problems

COURSE OUTCOMES: Skill Development

After completion of the course, Student will be able to

CO1	Understand different methods used for the simplification of Boolean functions
CO2	Explain the fundamentals of VHDL / Verilog HDL
CO3	Design and implement combinational circuits
CO4	Design and implement synchronous sequential circuits
CO5	Design and implement asynchronous sequential circuits

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REFERENCES:

1. Morris Mano M. and Michael D. Ciletti, "Digital Design", Pearson Education, 2013.
2. John F. Wakerly, "Digital Design Principles and Practices", Seventh Edition, Pearson Education, 2015.
3. Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition – Jaico Publishing House, Mumbai, 2013.
4. Donald D. Givone, "Digital Principles and Design", Tata Mcgraw Hill, 2013.
6. Kharate G. K., "Digital Electronics", Oxford University Press, 2010.
7. http://nptel.ac.in

19021T352		DIGITAL PRINCIPLES AND DESIGN LAB	L	T	P	C
			0	0	2	1

LIST OF EXPERIMENTS: Skill Development, Employability

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code

converters.
3. Design and implementation of combinational circuits using MSI devices: 4 – bit binary adder / subtractor Parity generator / checker Magnitude Comparator Application using multiplexers
4. Design and implementation of sequential circuits: Shift –registers - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system

Hardware: 1. Digital trainer kits 302. Digital ICs required for the experiments in sufficient numbers
Software: 1. HDL simulator

TOTAL: 30 HOURS

19021T304	PROBLEM SOLVING USING PYTHON	L	T	P	C
		3	0	0	3

PREREQUISITE:
Programming Languages

COURSE OBJECTIVES:
1. To know the basics of problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditions, loops and data structures.
4. To define Python functions and call them.
5. To do input/output with files in Python.

UNIT I **PROBLEM SOLVING AND PYTHON INTRODUCTION** **9 Hours**

Problem solving techniques: Program development life-cycle – Algorithms – building blocks of algorithms -Flowchart– Pseudo Code-Illustrative problems. Introduction to Python, Python Interpreter and its working, Syntax and Semantics

UNIT II **PYTHON BASICS** **9 Hours**

Data Types, operators, loops, Assignments and Expressions, Control Flow Statements.

UNIT III **DATA STRUCTURES AND FUNCTIONS** **9 Hours**

Lists-Tuples-Dictionaries-Functions and lambda expressions-Iterations and Comprehensions.

UNIT IV **FILES,MODULES AND Packages** **9 Hours**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages

UNIT V **CLASSES OBJECTS And REGULAR EXPRESSIONS** **9 Hours**

Overview of OOPs terminology-class-inheritance-overloading-Regular Expressions

TOTAL: 45 HOURS

Course Outcomes: Employability
At the end of this course, students will be able to,
CO1 : Execute Python code in variety of environments
CO2 :Use the correct Python control flow construct
CO3 : Design Data structures and functions using python
CO4 : Implement File, Modules and Packages concepts using Python
CO5 : Create their own classes and use existing python classes

FURTHER READING: Python for Data Science

REFERENCES:

1. Martin. C. Brown, "PYTHON: The Complete Reference", McGraw-Hill, Revised and updated for
2. Naomi R. Ceder , The Quick Python Book, Second Edition,2010
3. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for
4. Python 3.2, Network Theory Ltd., 2011.
5. John V Guttag, —Introduction to Computation and Programming Using Python‘‘, Revised and
6. expanded Edition, MIT Press , 2013
7. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An
8. Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
9. Allen B. Downey ,"Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updatedfor Python 3,Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)

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11. http://nptel.ac.in/

19021T353	PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	2	1

Skill Development, Employability

List of Experiments:

1. Study of key features of the Python language, intro to the Python IDE's
2. Play with Data types, keywords, conditional and control statements, looping, branching
3. Implement Python program concepts using List, Tuple and Dictionaries
4. Implement Functions using Python
5. Perform the following file operations using Python
   a) Traverse a path and display all the files and subdirectories in each level till the Deepest level for a given path. Also, display the total number of files and subdirectories.
   b) Read a file content and copy only the contents at odd lines into a new file.
6. Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
7. Perform Sorting and Searching using Python
8. Perform the following file operations using Python
   a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories.
   b) Read a file content and copy only the contents at odd lines into a new file
9. Perform exception handling using Python
10. Implement Python programming concepts using classes and objects
11. Using Regular Expressions, develop a Python program to
    a) Identify a word with a sequence of one upper case letter followed by lower case letters.
    b) Find all the patterns of "1(0+)1" in a given string.
    c) Match a word containing 'z' followed by one or more o's.Prompt the user for input.
12. Devise a Python program to implement the Hangman Game.
13. Simulate bouncing ball using Pygame

Requirements:
Software:
Operating System: Windows /Linux operating system
Tool: Python 3.6 (or above)
IDE: Pycharm, Spyder

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TOTAL: 30 HOURS

Online Resource:
https://www.learnpython.org/
https://wiki.python.org/moin/BeginnersGuide/Programmers
https://www.python.org/about/gettingstarted/
https://www.javatpoint.com/python-tutorial
https://www.geeksforgeeks.org/python-programming-language/

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

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

COURSE OUTCOMES: Upon completion of this course, students will be able to Employability

1. Describe how biological observations of 18th Century that lead to major discoveries.
2. Classify biology based on morphological, biochemical and ecological matters
3. Describe the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
4. Analyze biological processes at the reductionistic level
5. Describe about all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
6. Classify enzymes and distinguish between different mechanisms of enzyme action.
7. Describe DNA as a genetic material in the molecular basis of information

	transfer. 8. Apply thermodynamic principles to biological systems. 9. Classify microorganisms. 10. Describe about bio-inspired engineering.

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

Introduction to Biology, fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Exciting aspect of biology - need to study biology- Discussion about biological observations of 18th Century - major discoveries. Examples from Brownian motion and the origin of thermodynamics - original observation of Robert Brown and Julius Mayor.

Classification - morphological, biochemical or ecological. Hierarchy of life forms at phenomenological level. classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms for the study of biology- E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus

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

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

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

Module III	Biomolecules and Enzymes	**10 Hours**

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

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

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

Module IV	Metabolism and Microbiology	**8 Hours**

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

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

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

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

	Total:	**45 Hours**

REFERENCES:

1. Biology for Engineers, Rajiv Singal , CBS Publishers and Distributors Pvt Ltd; First Edition edition (4 June 2019).
2. Biology for Engineers, Wiley, Editorial, Wiley (2018).
3. Principles of Soft Computing, S. N. Sivanandam, S. N. Deepa, Wiley; Third edition (2018).
4. Computational Medicine: Tools and Challenges, Zlatko Trajanoski, Springer; 2012 edition (19 September 2012).

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5. Health Informatics - E-Book: An Interprofessional Approach, Ramona Nelson, Nancy Staggers, Elsevier; 2 edition (December 8, 2016).
6. Biology for Engineers, G.K..Suraishkumar, Oxford University Press
7. Biology for Engineers, Arthur T. Johnson, CRC Press

1902MCX02	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

Course Content

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries.

The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our ownancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content Employability

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

TOTAL: 30 HOURS

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1904GE351	LIFE SKILLS: VERBAL ABILITY	L	T	P	C
		0	0	2	1

Course Objectives:

The students should be made to:

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

COURSE OUTCOMES: Skill Development

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

ASSESSMENT PATTERN :

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

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1902IT401		DATABASE MANAGEMENT SYSTEMS	L	T	P	C
			3	0	0	3

AIM: To introduce the concepts of database management systems and the design of relational databases.

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

O3verview 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 / 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	Classify the modern and futuristic database applications based on size and complexity
CO2	Map ER model to Relational model to perform database design effectively
CO3	Apply queries using normalization criteria and optimize the queries
CO4	Compare and contrast various indexing strategies in different database systems
CO5	Appraise how advanced databases differ from traditional databases
CO6	Design XML schema, able to write XML queries for information retrieval

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.

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

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

5.Raghu Ramakrishnan, —Database Management Systemsl, Fourth Edition, McGraw-Hill College Publications, 2015.

6.Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education, 2012

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7. http://nptel.ac.in/
8. http://coursera.org/

1902IT451		DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
			0	0	2	1

Skill Development, Employability

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** 1. Hospital management 2. Railway ticket reservation 3. Student Mark list processing 4. Employee pay roll processing 5. Inventory control

TOTAL: 30 HOURS

REQUIREMENTS:

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

Software:
Front end: Visual Studio or Java or Equivalent
Back end: Oracle / MySQL/ Sql Server DB2 or Equivalent.

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FURTHER READING / SEMINAR :

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

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

1902IT402	JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

AIM: The main objective of this course is used to develop object oriented programming, event driven, programming paradigm concept using Java

PREREQUISITE: Programming in C & C++, Database Management Systems

COURSE OBJECTIVES:

1. Enable learners to write Java programming using Object Oriented Programming Concepts
2. Develop Java programming using Event Driven and Strings
3. Familiar with Swings concepts using Java
4. Learn to think Java program using real time concepts and paradigms

UNIT I	**CLASSES AND OBJECTS**	**9 Hours**
Object oriented Programming – Objects - Classes – Encapsulation – Methods – Constructor – Java Documents		
UNIT II	**ARRAYS, STRINGS, INHERITANCE**	**9 Hours**
I/O operations - Arrays – Strings – Inheritance – Interface- Polymorphism		
UNIT III	**EVENT DRIVEN PROGRAMMING**	**9 Hours**
Packages - Events Handlers - Applets – Swings		
UNIT IV	**CONNECTIVITY**	**9 Hours**
ODBC-JDBC – Threading – Exception Handling		
UNIT-V	**APPLICATION PROGRAMMING**	**9 Hours**
Scripting – JSP- Servlet – Session Management – Full Stack Development		
	TOTAL:	**45 Hours**

FURTHER READING / SEMINAR	
	J2EE, J2ME, Mobile Application Development, Software Development
COURSE OUTCOMES	Employability

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

CO1: Understand the basic concepts of Java Programming
CO2: Develop Java program using classes, objects, and encapsulation
CO3: Design Inheritance and Interface using Java
CO4: Implement Event Handler, JDBC and Exception Handling concepts using Java
CO5: Create real time application using Java

REFERENCES:

1. Herbert Schidt, "The Complete Reference of Java", Ninth Edition, Oracle Press, 2017
2. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Eighth Edition, Sun Microsystems Press, 2012.
3. K. Arnold and J. Gosling, "The JAVA programming language", Pearson Education, 2016.
4. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2012.
5. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2015.
6. https://ilearning.oracle.com/
7. http://nptel.ac.in/

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1902IT452	JAVA PROGRAMMING LAB	L	T	P	C
		0	0	2	1

PREREQUISITE: Programming in C & C++, Database Management Systems

LIST OF EXPERIMENTS:

MODULE – 1 Skill Development — **10 Hours**

1. Study of key features of the Java language, intro to the Java Development Kit (JDK) and Java Virtual Machine
2. Play with Data types, keywords, encapsulation, conditional and control statements, looping, branching
3. Implement Java programming concepts using Classes and Objects
4. Implement Java programming concepts using Arrays, Inheritance and Interfaces
5. Perform event handlers program using Java

MODULE – 2 Employability — **20 Hours**

1. Design a class for Complex numbers in Java. In addition to methods for basic operations on complex numbers, provide a method to return the number of active objects created.
2. Develop a simple paint-like program that can draw basic graphical primitives in different dimensions and colors. Use appropriate menu and buttons.
3. Develop a scientific calculator using even-driven programming paradigm of Java.
4. Write a multi-threaded Java program to print all numbers below 100,000 that are both prime and Fibonacci number
5. Develop Mini-Project for Library Automation System using Events, JDBC and Exception Handling

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Requirement for a batch of 30 students

Software:

Operating System: Windows /Linux operating system
Tool: JDK 1.6 (or above)
IDE: Net beans or Eclipse

TOTAL: 30 Hours

1902IT403	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

AIM: To provide an understanding of the functions and modules of an operating system and study the concepts underlying its design and implementation.

PREREQUISITE: Programming in C & C++, Database Management Systems, Computer Architecture

COURSE OBJECTIVES:

1. Study the basic concepts and functions of operating systems.
2. Learn about Processes, Threads and Scheduling algorithms.
3. Understand the principles of concurrency and Deadlocks.
4. Learn various memory management schemes.
5. Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I	INTRODUCTION AND PROCESS MANAGEMENT	9 Hours

1902IT404		SOFTWARE ENGINEERING AND PROJECT MANAGEMENT	L	T	P	C
			3	0	0	3

AIM: The main objective of this course is used to introduce the concepts of software development, design and implementation.

PREREQUISITE	Programming in C++, Java Programming, Data base Management Systems

COURSE OBJECTIVES:

1. Understand the phases in a software project
2. Understand fundamental concepts of requirements engineering and Analysis Modeling.
3. Learn various testing and maintenance measures
4. To learn Aspect Oriented Programming Concepts
5. To outline the need for Software Project Management and to highlight different techniques for software cost estimation and change management

UNIT I	**SOFTWARE PROCESS AND SPECIFICATIONS**	**9 Hours**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models, Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management

UNIT II	**SOFTWARE DESIGN**	**9 Hours**

Overview of System Design -System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design-Architectural Design -User Interface Design-Component level

UNIT III	**SOFTWARE IMPLEMENTATION AND TESTING**	**9 Hours**

Software Implementation Techniques: Coding practices-Refactoring- Software testing fundamentals & Techniques: White box testing- Black box testing-Case study- Levels of testing : Unit Testing ,Integration Testing – System Testing and Debugging-Regression Testing- Acceptance testing-reverse engineering and re-engineering.

UNIT IV	**ASPECT ORIENTED SOFTWARE DEVELOPMENT**	**9 Hours**

AO Design Principles -Separations of Concerns, Subject Oriented Decomposition, Traits, Aspect Oriented Decomposition, Theme Approach, Designing Base and Crosscutting Themes, Aspect-Oriented Programming using Aspect-J

UNIT V	**SOFTWARE PROJECT MANAGEMENT AND CONTROL**	**9 Hours**

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO Models - Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Process and Project Metrics- Document Preparation and Production- Cost monitoring – Earned Value Analysis – Change control- Software Configuration Management – Managing contracts – Contract Management-Managing people

TOTAL: 45 Hours

FURTHER READING / SEMINAR

Software Development, Software Testing, Software Quality Assurance, Software Configuration Management

COURSE OUTCOMES Employability, Entrepreneurship

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

CO1: Compare different Process models
CO2: Understand different types of requirements and requirement Engineering process Employability
CO3: Understand the systematic procedure for software design and deployment
CO4: Compare and contrast the various testing and maintenance & Entrepreneurship
CO5: Understand the concept of change management during development.
CO6: Explain the basic concepts of AOP

REFERENCES:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition, 2017.
2. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2014
3. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2015.
4. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2015.
5. AspectJ in Action, RamnivasLaddad, Manning Publications, 2013
6. Aspect-Oriented Software Development, Robert E. Filman, TzillaElrad, Siobhan Clarke, and Mehmet Aksit, October 2014.
7. http://nptel.ac.in/.

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1902IT405		COMPUTER NETWORKS	L	T	P	C
			3	2	0	4

AIM: The main objective of this course is to understand the concept of computer network, various routing protocols, routing procedures for communications

PREREQUISITE	Fundamentals of computer programming, Digital principles and system design

COURSE OBJECTIVES:

1. Identify the components required to build different types of networks
2. To learn about the division of network functionalities into layers.
3. Identify solution for each functionality at each layer
4. Choose the required functionality at each layer for given application

UNIT I	**PHYSICAL AND DATA LINK LAYER**	**12 Hours**

Computer Network – OSI Model – Communication Systems – Protocol and Standards – Wired vs Wireless – Data link layer – Error and Flow Control – Hamming Code – MAC - Case study: CSMA/CD & CA, Token Bus, Token Ring, Hub, Bridges

UNIT II	**NETWORK AND TRANSPORT LAYER**	**12 Hours**

Internetworking – Virtual and Datagram - IP Address: IPv4, IPv6 – Routing: Link state, Distance vector – UDP – TCP – Case study: Switch, Router

UNIT III	**ROUTING SERVICES**	**12 Hours**

Inter domain Routing – RIP – OSPF – BGP – ICMP – ARP – DHCP – Multicast routing

UNIT IV	**APPLICATION LAYER**	**12 Hours**

Link Layer Services – Framing – FTP – Web Services - Email – HTTP – DNS

UNIT V	**CASE STUDY**	**12 Hours**

IEEE Standards - Blue tooth – Wi-Fi – Network Management – SNMP – SNA – QoS – Congestion Control – Gateway

TUTORIALS **12 Hours**

1. Write a network application program
2. Use tools to visualize packet flow
3. Configure Router/Switch to set up network (network administration)
4. Simple Chat Program using TCP Sockets
5. Simulation of HTTP Protocol using TCP Sockets
6. Simulation of Sliding Window Protocol using TCP Sockets
7. Simulation of DNS using UDP Sockets
8. Simulation of Ping using Raw Sockets
9. Learn to use commands like TCP Dump, Netstat, Trace Route
10. Simulate networks using network simulators like NS-2
11. Performance comparison of MAC protocols using simulation tool
12. Performance comparison of Routing protocols using simulation tool

TOTAL: 60 Hours

FURTHER READING / SEMINAR

Distributed Computing, Cloud Computing, Network Programming

COURSE OUTCOMES

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

CO1: Illustrate the concepts of physical and data link layers
CO2: Explain the operations of network and transport layers } Employability
CO3: Understand various routing services
CO4: Design and implement a networking application incorporating the different layering protocols
CO5: Simulate various application layers and real time network manage protocols } Entrepreneurship

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A systems approachl, Fifth Edition, Morgan Kaufmann Publishers, 2016.
2. Forouzan, Behrouz A., and Firouz Mosharraf. Computer networks: a top-down approach, McGraw-Hill, Special Indian Edition 2016.
3. James F. Kurose, Keith W. Ross, —Computer Networking - A Top-Down Approach Featuring the Internetl, Sixth Edition, Pearson Education, 2013.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, —Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2012.
5. Nader. F. Mir, —Computer and Communication Networks, Pearson Prentice Hall Publishers, 2015
6. http://nptel.ac.in/

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19021T406		PRINCIPLES OF COMMUNICATION	L	T	P	C
			3	0	0	3

AIM: This course is study the concepts of various communication techniques

COURSE OBJECTIVES:

This course is a graduate level introduction to the basic principles of digital communication systems. A digital communication system is one that transmits a source (voice, video, data, etc.) from one point to another, by first converting it into a stream of bits, and then into symbols that can be transmitted over channels (cable, wireless, storage, etc.). The use of the digital bit-stream as the interface between the source and the channel is universal regardless of what kind of source and channel are involved.

UNIT I	FUNDAMENTALS OF ANALOG COMMUNICATION	9 Hours

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation FM andPM waveforms, phase deviation and modulation index, frequency deviation and percent modulation,Frequency analysis of angle modulated waves, Bandwidth requirements for Angle modulated waves

UNIT II	DIGITAL COMMUNICATION	9 Hours

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSKbit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying - binaryphase shift keying - QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costas loop, DPSK.

UNIT III	DIGITAL TRANSMISSION	9 Hours

Introduction, Pulse modulation,PCM sampling, sampling rate, signal to quantization noise rate,companding analog and digital percentage error, delta modulation, adaptive delta modulation, differentialpulse code modulation, pulse transmission – Intersymbol interference, eye patterns.

UNIT IV	SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES	9 Hours

Introduction, Pseudonoise sequence, DS spread spectrum with coherent binary PSK, processing ga, FHspread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications

UNIT V	SATELLITE AND OPTICALCOMMUNICATION	9 Hours

Satellite Communication Systems-
Keplers Law,LEO and GEO Orbits, footprint, Link modelOpticalCommunication Systems-
Elements of Optical Fiber Transmission link, Types, Losses, Sources and Detectors.

TOTAL:	45 HOURS

FURTHER READING / SEMINAR :

1. Mobile Communications
2. Wireless Communications

COURSE OUTCOMES: Employability

After completion of the course, Student will be able to

CO1	Understand the concepts of analog communication techniques
CO2	Understand the concepts of digital communication techniques
CO3	Explain various digital communication techniques with keying principles
CO4	Analyze the performance Spread Spectrum and multiple access techniques
CO5	Explain satellite and optical communication

REFERENCES:

1. Wayne Tomasi, "Advanced Electronic Communication Systems",PearsonEducation, 2016.
2. Simon Haykin, "Communication Systems", 7th Edition, John Wiley & Sons., 2012.
3. H.Taub,D L Schilling ,G Saha ,"Principles of Communication"3/e,2011.
4. B.P.Lathi,"Modern Analog And Digital Communication systems", 3/e, OxfordUniversity Press, 2012
5. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2012.
6. Martin S.Roden, "Analog and Digital Communication System", 5th Edition, PHI, 2012.
7. http://nptel.ac.in
9. http://coursera.org

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

COURSE OBJECTIVES:

The students should be made to:

1. To develop the students basic soft skills and enable them to get a job.
2. To develop the students' interpersonal skills and to enable them to respond effectively.
3. To develop the students selling skills and to enable them to apply in their interview process.
4. To develop the students' Corporate Etiquettes and enable them to respond effectively.
5. To develop the students' learning by practice of giving different situations.

Unit I	INTRODUCTION TO SOFT SKILLS	6 Hours

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

Unit II	TEAM VS TRUST	6 Hours

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

Unit III	SELLING ONESELF	6 Hours

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

Unit IV	CORPORATE ETIQUETTES	6 Hours

What is Etiquette – Key Factors – Greetings – Meeting etiquettes – Telephone etiquettes – email etiquettes – Dining etiquettes – Dressing etiquettes – Rest room etiquettes – Life etiquettes

Unit V	LEARNING BY PRACTICE	6 Hours

1. My family. Myself. 2. Meeting people. Making Contacts.3. A city. Getting about town. 4. Our flat. Home life.5Travelling. Going abroad.6. Going through Customs.7. At a hotel.8. Shopping. 9. Eating out.10. Making a phone call.11A modern office.12 Discussing business.

TOTAL 30 Hours

COURSE OUTCOMES: Skill Development

At the end of course students should be able to,

CO1	Students are enabled to communicate effectively in their business environment
CO2	Learners are ensured that they improve their interpersonal skills which is mandatory in a corporate world
CO3	Students are trained to brand themselves to acquire a job
CO4	Students are trained to involve in corporate etiquettes.
CO5	Students are learnt to survive in the different situations

REFERENCES:

1 Dr.k.Alex, "soft skills "Third Edition, S.Chand & Publishing Pvt Limited, 2015
2. Aruna koneru, 'Professional Communication' Second Edition, Tata McGraw-Hill Education, 2012
3. D.K.Sarma,'You & Your Career 'First Edition Wheeler Publishing & Co Ltd; 2010
4. Shiv Khera 'You Can Win' Third Edition Mac Millan Publisher India Pvt Limited, 2011

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ASSESSMENT PATTERN:

1. Two assignments will be conducted (25 * 2) - 50 marks
2. Pragmatic Assessment - 50 Marks

1901MCX01	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0

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.

Module 1: ECOSYSTEMS AND BIODIVERSITY - 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

Module 2: ENVIRONMENTAL POLLUTION -Definition – Source, causes, effects and control measures of: (a) Air pollution – Mitigation procedures – Control of particulate and gaseous emission, Control of SOX, NOx, CO and HC) – E-Waste - Technology for capturing CO2 (metallo- organic frame works) (b) Water pollution – Waste water treatment processes. (c) Soil pollution – soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – role of an individual in prevention of pollution – pollution case studies. Documentation study of local polluted site – Urban / Rural / Industrial / Agricultural.

Module 3: SOCIAL ISSUES AND THE ENVIRONMENT - From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – consumerism and waste products – environment protection act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments – scheme of labeling of environmentally friendly products (Ecomark) central and state pollution control boards – disaster management: floods, earthquake – Public awareness. Analyze the recent steps taken by government of India to prevent pollution (Green India and Clean India).

Module 4: HUMAN POPULATION AND THE ENVIRONMENT - 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

	TOTAL:	30 HOURS

COURSE OUTCOMES: Employability

After completion of the course, Student will be able to

CO1: Describe the importance of ecosystem and its conservation.

CO2: Differentiate various natural resources and the urgent need to conserve the natural resources.

CO3: Explain the different types of pollution and its effects.

CO4: Describe the various environmental protection acts.

CO5: Explain the major diseases, women, child development and the impacts of population explosion.

REFERENCES:

1. Trivedi. R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II. Enviro Media, 3rd edition, BPB publications, 2010.
2. Cunningham, W.P.Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan. R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
5. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.
6. Ravikrishnan. A., "Environmental Science and Engineering", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.

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		L	T	P	C
1702IT501	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3

PREREQUISITE:

1. Software Engineering and Project Management.

COURSE OBJECTIVES:

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

UNIT I UML DIAGRAMS **9Hours**

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

UNIT II DESIGN PATTERNS **9 Hours**

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 Hours**

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 Hours**

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 Hours**

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

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Software Development.
2. Software Design.

Course Outcomes:

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

CO1: Design and implement projects using OO concepts
CO2: Use the UML analysis and design diagrams
CO3: Apply appropriate design patterns
CO4: Create code from design
CO5: Compare and contrast various testing techniques

Entrepreneurship

Employability

REFERENCES:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2016.
2. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2012.
3. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 2012.
4. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2013.
5. Paul C. Jorgensen, "Software Testing:- A Craftsman"s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2010.
6. http://nptel.ac.in/

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		L	T	P	C
1702IT502	DISTRIBUTED COMPUTING	3	0	0	3

PREREQUISITE:

1. Computer Networks

COURSE OBJECTIVES:

1. To provide knowledge on principles underlying the design of distributed systems
2. To lay the foundations of Distributed Systems.
3. To introduce the idea of Distributed Architecture.
4. To introduce the idea of Distributed operating system and related issues.

UNIT I BASIC CONCEPTS **9 Hours**

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

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

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

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

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

UNIT IV RESOURCE MANAGEMENT **9 Hours**

Time and Global States-Introduction-Clocks, Events and Process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging-Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections Algorithm- Multicast communication-Consensus and related problems

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

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

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cloud Computing.
2. Service Oriented Architecture.
3. Deep Learning.

Course Outcomes: Employability

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

CO1: Articulate the principles and standard practices underlying the design of distributed systems.
CO2: Explain the core issues of distributed systems.
CO3: Appreciate the difficulties in implementing basic communication in distributed systems.
CO4: Have knowledge on the substantial difficulty in designing distributed algorithms in comparison to centralized algorithms.
CO5: Appreciate the issues in distributed operating system, resource management and distributed file system.

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, —Distributed Systems Concepts and Designl, Seventh Edition, Pearson Education Asia, 2016.
2. Introduction to Parallel Computing, Second Edition, AnanthGrama, Anshul Gupta, George arypis, Vipin Kumar,: Addison Wesley 2013
3. Ajay D. Kshemkalyani and MukeshSinghal, —Distributed Computing: Principles, Algorithms and Systemsl, Cambridge Press. 2014
4. A.S.Tanenbaum, M.Van Steen, —Distributed Systemsl, Pearson Education, 2012.
5. M.L.Liu, —Distributed Computing Principles and Applicationsl, Pearson Addison Wesley, 2014.
6. Tom White, —Hadoop: The Definitive Guidel, O'REILLY Media, 2011.
7. http://nptel.ac.in/

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1702IT503	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	2	4

PREREQUISITE:

Engineering Graphics, Computer Programming

COURSE OBJECTIVES:

1. Provide in-depth knowledge of display systems, image synthesis and shapes.
2. Understand basic concepts related to Multimedia including data standards, algorithms and software.
3. Develop multimedia applications by utilizing existing libraries.

UNIT I GRAPHICS FUNDAMENTALS **9 Hours**

Introduction-Line Circle and Ellipse Drawing Algorithm-Attribute-Two dimensional geometric transformation-Two dimensional Clipping and Viewing

UNIT II TWO DIMENSIONAL GRAPHICS **9 Hours**

Two dimensional geometric transformations - Matrix representations and homogeneous co ordinates, composite transformations: window to-viewport coordinate transformation, Two dimensional viewing functions: clipping operations-Point Clipping - Line Clipping: Cohen Sutherland, Liang Barsky -Polygon Clipping: Sutherland Hodgeman

UNIT III THREE DIMENSIONAL GRAPHICS **9 Hours**

3D concepts and object representation:3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bezier curves and surfaces, B-spline curves and surfaces.

3D transformation and viewing:3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.

UNIT IV ANIMATION **9 Hours**

Text: Using Text in Multimedia, computer and text, Font Editing and design tools, hypermedia and hypertext - Image: Making Still Images, color, Image File format, Principles of Animation, animation by computer, making animation - Video: Digital video containers, shooting and editing video.

UNIT V MULTIMEDIA **9 Hours**

Basic software tools - Text, image, and sound editing tools - painting and drawing tools, animation tools - making instant multimedia - Office suite - Multimedia authoring tools: Types and page based authoring tools, icon and time based authoring tools.

List of Experiments: **15 Hours**

1. Implementation of Line, Circle, Ellipse drawing Using DDA Algorithm and Bresenham Algorithm
2. Implementation of 2D Transformations
3. Implementation of 3D Transformations
4. Implementation of Line Clipping Algorithm
5. Use of various Photo editing tool to solve real time problems and apply various effects
6. Use of various Animation tools to solve real time problems and apply various effects
7. To perform a morphing effect of crying face to sad face to happy face and last to most happiest face.
8. Use of Open GL tool to perform Animation and Virtual Reality effects.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Computer Vision.
2. Visualization Techniques.

Course Outcomes: Entrepreneurship

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

CO1: Apply 2D graphics and algorithms to real world applications
CO2: Create interactive graphics applications using 3D modeling and transformation techniques
CO3: Understand the processes involved in the development of a multimedia product from client brief through to delivery
CO4: Plan and create a multimedia product that includes animation, audio and video

REFERENCES:

1. J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics; Principles and practice; Second Edition in C;; Addison Wesley, 2016

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2. Computer Graphics - C version; D. Hearn and M. P. Baker; Pearson Education, 2014.
3. Computer Graphics - OpenGL version; D. Hearn and M. P. Baker; Pearson Education, 2015
4. K. Andleigh, KiranThakrar , Multimedia Systems Design, PHI, 2012
5. ZeNian Li, S. Drew, "Fundamentals of Multimedia", PHI, 2012.
6. Donald Hearn and M Pauline Baker, Computer Graphics, Pearson Education, 2nd Edition, 2013.
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1702IT504	WEB PROGRAMMING	L	T	P	C
		3	0	2	4

PREREQUISITE:

1. Programming in Java Programming.
2. Database Management Systems

COURSE OBJECTIVES:

1. To understand the concept of client / server programming
2. To apply web programming languages for developing web applications
3. To know the unique features of scripting languages

UNIT I WEB ESSENTIALS **9 Hours**

Internet – Web clients – Web servers – Markup languages – Introduction to XHTML-Editing XHTML-Headings-Linking –Tables-Images-Forms-Internal linking – Frames - Lists- Cascading Style Sheets (CSS): Features-Style rule cascading and inheritance - Text properties –CSS box model.

UNIT II CLIENT SIDE PROGRAMMING **9 Hours**

Client side vs. Server side programming languages - Introduction to java script –Control statements I - Control statements II - Functions- Objects – Arrays – PHP Programming

UNIT III SERVER SIDE PROGRAMMING **9 Hours**

Java servlet: Architecture – Servlet life cycle -Simple programs using java servlet– Parameter data – Sessions – Cookies – Other servlet capabilities –Data storage –Servlet and concurrency- JDBC- Connecting a java servlet program to a database

UNIT IV XML AND WEB SERVICES **9 Hours**

XML Namespaces-DTD, and XML schema-XML parsers: DOM vs. SAX-XSLT – Xquery - XPath- JSP - Running JSP applications – Java beans classes and JSP - Web services concepts - Web services for clients – WSDL – Representing data types: XML schema – SOAP - J2EE

LIST OF EXPERIMENTS **24 HOURS**

1. Write a html program for Creation of web site with forms, frames, links, tables etc
2. Design a web site using HTML and DHTML. Use Basic text Formatting, Images,
3. Create a script that asks the user for a name, then greets the user with "Hello" and the user name on the page
4. Create a script that collects numbers from a page and then adds them up and prints them to a blank field on the page.
5. Create a script that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers.
6. Create a script that will check the field in Assignment 1 for data and alert the user if it is blank. This script should run from a button.
7. Using CSS for creating web sites
8. Creating simple application to access data base using JDBC Formatting HTML with CSS.
9. Program for manipulating Databases and SQL.
10. Program using PHP database functions.
11. Write a web application that functions as a simple hand calculator, but also keeps a "paper trail" of all your previous work
12. Install Tomcat and use JSP and link it with any of the assignments above
13. Reading and Writing the files using .Net
14. Write a program to implement web service for calculator application
15. Implement RMI concept for building any remote method of your choice.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Software Development

2. Mobile Application Development

Course Outcomes

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

CO1: Design web pages using HTML and CSS } Entrepreneurship
CO2: Develop web pages using java script
CO3: Develop server side programming techniques to solve real time application } Employability
CO4: Apply database concept to create interactive web pages
CO5: Apply JSP concepts to solve real time applications
CO6: Understand the basic concept of web services

REFERENCES:

1.Jeffrey C Jackson, Web Technology – A computer Science perspective, Person Education, New Delhi, 2016.
2. Frank. P. Coyle, XML, Web Services and the Data Revolution, Addison-Wesley Professional, 2012.
3. Chris Bates, Web Programming – Building Internet Applications, Wiley India, 2013.
4. Deitel, Deitel and Neito, Internet and World wide web – How to program, Pearson education, New Delhi, 2016.
5. Gopalan. N.P, Web Technology A Developer Perspectives, PHI, 2012
6. H.M.Deitel, P.J.Deitel, T.R.Nieto, T.M.Lin, XML How to Program, Pearson Education,2012
7. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, Developing Java Web Services, Wiley Publishing Inc., 2011.
8. Steve Graham and Doug Davis, Building Web services with Java, Pearson Education 2011
9.http://nptel.ac.in/
10.http://sololearners.com/
11. http://tutorialpoint.org

1704IT551	CASE TOOLS (MINI PROJECT 1)	L	T	P	C
		0	0	2	1

PREREQUISITE :

Software Engineering and Project Management

COURSE OBJECTIVES:

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

TO DEVELOP A MINI-PROJECT USING FOLLOWING PROBLEM STATEMENTS

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

TOTAL:45 HOURS

REQUIREMENTS:

Argo UML or Eclipse IDE or Rational Suite or Visual Paradigm or equivalent

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1. Commercial building like sky scrapers
2. Domed structures

COURSE OUTCOMES

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

CO1: Design and implement projects using OO concepts. Skill Development
CO2: Use the UML analysis and design diagrams. Entrepreneurship
CO3: Apply appropriate design patterns.
CO4: Create code from design. Employability
CO5: Compare and contrast various testing techniques

REFERENCES:

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2016.
2. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using

UML", Fourth Edition, Mc-Graw Hill Education, 2012.
3. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, "Design patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley, 2012.
4. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Third edition, Addison Wesley, 2013.
5. Paul C. Jorgensen, "Software Testing:- A Craftsman"s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2010.

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

PREREQUISITE :

Technical English – I and II

COURSE OBJECTIVES:

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

Unit I **Introduction to Number System, Basic Shortcuts of addition, Multiplication, Division** **6 Hours**

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

Unit II **Ratio and proportion, Averages** **6 Hours**

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

Unit III **Percentages, Profit And Loss** **6 Hours**

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

Unit IV **Coding and decoding, Direction sense** **6 Hours**

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

Unit V **Number and letter series Number and Letter Analogies, Odd man out** **6 Hours**

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

Total: 30 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Verbal Reasoning, Non-Verbal Reasoning, Quantitative and Qualitative Apptitude

COURSE OUTCOMES: Skill Development

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

CO1: Learners should be able to understand number and solving problems least time using various shortcut

CO2: Solve problems on averages; compare two quantities using ratio and proportion.

CO3: Calculate concept of percentages, implement business transactions using profit and loss.

CO4: Workout concepts of Coding and Decoding, ability to visualize directions and understand the logic behind a sequence.

CO5: Learners should be able to find a series the logic behind a sequence.

REFERENCES:

1. Arun Sharma, „How to Prepare for Quantitative Aptitude for the CAT", 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, „How to Prepare for Logical Reasoning for CAT", 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, „A modern approach to Logical reasoning", revised edition, S.Chand publication, 2017.
4. R S Agarwal, „Quantitative Aptitude for Competitive Examinations" revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", Arihant Publication, 2018.

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6. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihnat publication, 2014.

1704IT552	TECHNICAL SEMINAR	L	T	P	C
		0	0	2	1

Skill Development

COURSE OBJECTIVES:

1. To develop the self-learning skills to utilize various technical resources available from multiple field.
2. To promote the technical presentation and communication skills.
3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.

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

TOTAL: 45 HOURS

ASSESSMENT PATTERN :

Continuous Assessment (100 Marks)

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

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1703IT003	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

AIM: The main objective of this course is to understand the concepts of Artificial Intelligence and Computer vision.

PREREQUISITE: Computer Networks, Software Engineering and Project Management

COURSE OBJECTIVES:

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

UNIT I	INTRODUCTION TO AI	9 Hours

Artificial Intelligence – Problem Solving – Production Systems – Algorithms Analysis – Searching Techniques – Case Study: Constraint Statisfication Problem, Hill Climbing

UNIT II	KNOWLEDGE REPRESENTATION	9 Hours

Knowledge Representation – Predicate Calculus – Inference – Forward & Backward Chaining – Bayes Theory – Fuzzy Approach – Case Study: Game Playing

UNIT III	PLANNING	9 Hours

Basic Plan generation – Strips Language – Scheduling - Explanation – Case Study: Graph Coloring, Reactive Systems

UNIT IV	MACHINE LEARNING	9 Hours

Machine Learning Techniques – Types – Approaches – Applications – Case Study: Ontology, Deep Learning

UNIT V	EXPERT SYSTEMS	9 Hours

Expert systems - Architecture of expert systems, Roles of expert systems – Case Study: Recommendation Systems, Smart GRID, Industrial Internet Search Engines, Social Semantics, Natural Language Processing

TOTAL: 45 Hours

FURTHER READING: Machine Vision Systems, Real Time Learning and Decision making systems

COURSE OUTCOMES Employability

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

CO1: Understand the basic of Artificial Intelligence and Problem Solving
CO2: Apply various knowledge representation in solve problems
CO3: Explain various planning techniques and case studies
CO4: Understand different machine learning techniques and case studies
CO5: Explain various expert system applications

REFERENCES:

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill- 2016.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2012.
3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2016.
4. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education, 2010.
5. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education, 2013.
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1703IT004	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

AIM: To provide an understanding of the theoretical development of computer science, particularly for finite representations of languages and machines.

PREREQUISITE: Engineering mathematics, Problem Solving Techniques

COURSE OBJECTIVES:

1. Construct finite state machines and the equivalent regular expressions.
2. Prove the equivalence of languages described by finite state machines and regular expressions.
3. Construct pushdown automata and the equivalent context free grammars
4. Construct Turing machines and Post machines.
5. Be aware of Decidability and Un-decidability of various problems.
6. Learn types of grammars

UNIT I	AUTOMATA THEORY	9 Hours

Abstract machines and computation, formal languages and grammars, finite state machines- Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) -Equivalence of DFA and NFA- NFA to DFA conversion-Minimization of DFA.

UNIT II	REGULAR EXPRESSIONS AND LANGUAGES	9 Hours

Regular Expression (RE) - Converting Regular Expression to FA- Converting FA to Regular Expression -Proving languages not to be regular – Closure and Decision properties of Regular Expression - Equivalence and minimization of Automata.

UNIT III	CONTEXT FREE GRAMMARS AND PUSH DOWN AUTOMATA	9 Hours
Context-free grammars-Ambiguity in grammars and languages-simplification of content-free grammars, Pushdown automata, deterministic and non-deterministic pushdown automata and their equivalence with context free languages -Chomsky normal form, Greibach normal form- Closure properties of context-free languages.		
UNIT IV	TURING MACHINES	9 Hours
Turing machines, computable languages and functions, modifications of Turing machines, Multi head and Multi tape Turing Machines - The Halting problem – Partial Solvability – Problems about Turing machine- Chomsky hierarchy of languages.		
UNIT V	UNSOLVABLE PROBLEMS	9 Hours
Recursive, and recursively enumerable languages; Undecidability, notion of reduction-Undecidable Problems about Turing Machines – Post's Correspondence Problem		
	TOTAL:	45 Hours

FURTHER READING: Machine Vision Systems, Real Time Learning and Decision making systems

COURSE OUTCOMES

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

CO1: Explain automata theory as the basis of all computer science languages design
CO2: Construct automata for regular expression and perform minimization of automata
CO3: Perform simplification in grammars and build normalized grammars
CO4: Construct Push Down Automata for a simple Application.
CO5: Construct Turing Machine for a simple Application
CO6: Explain Undecidable problems and measure complexity.

REFERENCES:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, —Introduction to Automata Theory, Languages and Computations!, Third Edition, Pearson Education, 2016
2. John C.Martin, —Introduction to Languages and the Theory of Computation, Fourth Edition, Tata McGraw Hill, 2012.
3. Kavi Mahesh, —Theory of Computation, A Problem-solving Approach! Wiley India Pvt. Ltd, 2012.
4. H.R.Lewis and C.H.Papadimitriou, —Elements of Theory of Computation, Second Edition, Pearson Education/PHI, 2013.
5. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2012.
6. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009
7. http://nptel.ac.in

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1703IT005	SOFTWARE TESTING METHODS AND TOOLS	L	T	P	C
		3	0	0	3

AIM: The main objective of this course is used to introduce the concepts of software testing & its levels and automated testing tools

PREREQUISITE: Software Engineering and Project Management

COURSE OBJECTIVES:

1. To know the behavior of the testing techniques to detect the errors in the software
2. To understand standard principles to check the occurrence of defects and its removal.
3. To learn the functionality of automated testing tools
4. To understand the models of software reliability

UNIT I	TESTING ENVIRONMENT AND TEST PROCESSES	9 Hours
World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing – Analysing and Reporting Test Results		
UNIT II	TESTING TECHNIQUES AND LEVELS OF TESTING	9 Hours
Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Unit Testing - Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing – Configuration Testing - Compatibility Testing - Case study for White box testing and Black box testing techniques		
UNIT III	INCORPORATING SPECIALIZED TESTING RESPONSIBILITIES	9 Hours
Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software –Testing a Data Warehouse - Case Study for Web Application Testing.		
UNIT IV	TEST AUTOMATION	9 Hours

Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.		
UNIT V	SOFTWARE TESTING AND QUALITY METRICS	9 Hours
Testing Software System Security - Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.		
	TOTAL:	45 Hours
FURTHER READING: Case study of Testing tools like Rational Robot, Amazon Tools		

COURSE OUTCOMES

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

CO1: Explain the software by applying testing techniques to deliver a product free from bugs

CO2: Evaluate the web applications using bug tracking tools. Employability

CO3: Investigate the scenario and the able to select the proper testing technique

CO4: Explore the test automation concepts and tools

CO5: Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma

CO6: Evaluate the estimation of cost, schedule based on standard metrics Entrepreneurship

REFERENCES:

1. William Perry, "Effective Methods of Software Testing", Third Edition, Wiley Publishing 2015
2. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2014.
3. NareshChauhan, "Software Testing Principles and Practices" Oxford University Press, New Delhi, 2014.
4. Stephen Kan, "Metrics and Models in Software Quality", Addison – Wesley, Second Edition, 2012.
5. LleneBurnstein, " Practical Software Testing", Springer International Edition, India, 2013.
6. RenuRajani,Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2010
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PROFESSIONAL ELECTIVE – II

1703IT006	MULTICORE PROGRAMMING	L	T	P	C
		3	0	0	3

AIM: This course is provide the advance concepts of process and controllers

PREREQUISITE: Computer Organization and Architecture

COURSE OBJECTIVES:

1. Understand the recent trends in the field of computer architecture and identify performance related parameters
2. Appreciate the need for parallel processing
3. Understand the challenges in parallel and multi-threaded programming
4. To understand the different types of multicore architectures

UNIT I	INTRODUCTION TO MULTICORE PROCESSORS	9 Hours
Scalable design principles – Principles of processor design – Instruction Level Parallelism, Thread level parallelism. Parallel computer models – Symmetric and distributed shared memory architectures – Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture.		
UNIT II	PARALLEL PROGRAMMING	9 Hours
Performance Issues – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and live locks communication between threads (condition variables, signals, message queues and pipes).		
UNIT III	OPEN MP PROGRAMMING	9 Hours
OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and live locks – Non-blocking algorithms – Memory and cache related issues.		
UNIT IV	MPI PROGRAMMING	9 Hours
MPI Model – MPI constructs – MPI Library –Point-to-point and Collective communication – data decomposition – communicators and topologies – MPI derived data types – Performance evaluation		
UNIT V	MULTITHREADED APPLICATION DEVELOPMENT	9 Hours
Case studies – n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison – Algorithms, program development and performance tuning.		
	TOTAL:	45 Hours
FURTHER READING: Case study of Testing tools like Rational Robot, Amazon Tools		

COURSE OUTCOMES	Employability

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

CO1: Identify the limitations of ILP and the need for multicore architectures
CO2: Discuss the issues related to multiprocessing and suggest solutions
CO3: Solve problems in Parallel Processors
CO4: Explain MPI Programming and topologies
CO5: Develop programs using OpenMP and MPI.

REFERENCES:

1. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2016.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Macgraw Hill, 2013.
3. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan Kaufmann/Elsevier, 2011.
4. John L. Hennessey and David A. Patterson, " Computer architecture – A quantitative approach", Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2011.
5. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/ software approach" , Morgan Kaufmann/Elsevier Publishers, 2012.
6. http://nptel.ac.in/

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1702IT601	C# AND .NET	L	T	P	C
		2	0	4	4

PREREQUISITE:

1. Programming in C, C++, Java Programming

COURSE OBJECTIVES:

1. Enable learners to write C# program using Object Oriented Programming Concepts.
2. Be familiar with .NET concepts.
3. Learn to think develop real time.NET applications.

UNIT I INTRODUCTION TO C# **9Hours**

C# Programming Basics – Data types – Variables – Expressions – Operators – Conditional & Control Statements – Looping –Boxing & Unboxing.

UNIT II OBJECT ORIENTED PROGRAMMING **9 Hours**

Classes – Objects – Constructors – Inheritance – Polymorphism – Event Handling – Threading – Exception Handling.

UNIT III APPLICATION DEVELOPMENT ON .NET **9 Hours**

Building Windows Applications – Forms – Menu – Dialog Box – Data Set – ADO.NET – SQL Server Connectivity.

UNIT IV WEB APPLICATION DEVELOPMENT ON .NET **9 Hours**

Programming using ASP.NET – XML – Virtual Applications – Session Management – Web.Config – Web Services – Versioning – Marshalling – Security.

LIST OF EXPERIMENTS: **24 Hours**

Module – 1: **10 Hours**

1. Study of C# and .NET frame work installation, configuration and running.
2. Wire C# program using Data types, Variables, Operators, Conditional & Control Statements, Looping, Boxing & Unboxing.
3. Develop C# program using class, object, inheritance, polymorphism, exception handling.
4. Implement Simple Web application using ASP.NET.
5. Implement Simple Database connectivity using ADO.NET.

Module – 2: **14 Hours**

1. Perform console application for generating Fibonacci series, Prime number, Natural Numbers, etc.
2. Write a program to calculator using windows application.
3. Develop Online Banking and Transaction process using Event Handling and ADO.NET.
4. Create web application for shopping cart process using ASP.NET.
5. Implement Session Management process for email applications.
6. Perform String Manipulation with the String Builder and String Classes and C#.

REQUIREMENTS: Microsoft Visual Studio .Net framework.

TOTAL: 60 HOURS

FURTHER READING:

1. Develop real time applications using ASP.NET

COURSE OUTCOMES Employability

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

CO1: Understand the basic concepts of C# Programming
CO2: Write C# program using classes, objects, and encapsulation
CO3: Understand the concepts of .NET framework
CO4: Design various applications using ADO.NET
CO5: Implement Web and Database Applications using .NET
CO6: Develop various real time applications using .NET concepts

REFERENCES:

1. Herbert Schidt, "The Complete Reference of C#",Tata McGraw Hill, 2017.
2. Kogent Learning Solutions C# Programming and .NET 4.5 Paperback, Dreamtech Press, 2013.
3. Beginning ASP.NET 4.5 in C# (APRESS) Paperback – 2014, by Matthew MacDonald, Dreamtech Press; Apress Special Priced edition.
4. Building Micro services with .NET Core 2.0: Transitioning monolithic architectures using micro services with .NET Core 2.0 using C# 7.0, Packt Publishing Limited, 2nd Revised edition, 2017.

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5. Paul C. Jorgensen, "Software Testing:- A Craftsman"s Approach", Third Edition, Auerbach Publications, Taylor and Francis Group, 2010.
6. http://nptel.ac.in/

1702IT602	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Computer Networks.

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION **9 Hours**

Mobile Computing – Mobile Computing Vs Wireless Networking – Mobile Computing: Applications – Characteristics– Structure. MAC Protocols: Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER **9 Hours**

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of Mobile Transport Layer, Traditional TCP Classical TCP improvements, TCP over 2.5/3G Wireless Networks, Performance Enhancing Proxies.

UNIT III MOBILE TELECOMMUNICATION SYSTEM **9 Hours**

Global System for Mobile Communication (GSM): Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services. – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT IV MOBILE AD-HOC NETWORKS **9 Hours**

Overview – Characteristics of MANET – spectrum of MANET applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Security in MANETs – Vehicular Ad Hoc networks (VANET) – MANET versus VANET.

UNIT V OPERATING SYSTEM FOR MOBILE DEVICES **9 Hours**

Commercial Mobile Operating Systems – Features of Windows CE, PalmOS, Symbian OS, and Java Card Support for Mobility: Pile systems, WWW, Wireless Application Protocol – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TOTAL: 45 HOURS

FURTHER READING:

1. On site seminar at Telecommunication networks

COURSE OUTCOMES Employability

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

CO1: Explain the basics of mobile telecommunication system
CO2: Choose the required functionality at each layer for given application
CO3: Identify solution for each functionality at each layer
CO4: Explain various mobile ad hoc network protocols
CO5: Use simulator tools and design Ad hoc networks

REFERENCES:

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2016.
2. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2014.
3. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2013.
4. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2012.
5. William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2012.
6. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2012.
7. http://nptel.ac.in/

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17021T603	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	0	2	4

PREREQUISITE:

Database Management Systems

COURSE OBJECTIVES:

1. Learn about the safe storage of data and architecture of data warehouse
2. Learn about the Elimination of errors from the data
3. Understand the Deleting data that is no longer important to the organization
4. Study the extraction of implicit, previously unknown, and potentially useful information from data
5. To help in the generation of reports for the management.

UNIT I INTRODUCTION TO DATA WAREHOUSING **9 Hours**

Introduction-Data warehouse Architecture– Online Analytical Processing (OLAP) Multidimensional data model– Data warehouse schema –OLAP Guidelines – Data Extraction, Clean up, and Transformation Tools – Metadata.

UNIT II DATA MINING PRIMITIVES AND CONCEPT DESCRIPTION **9 Hours**

Introduction to Data mining – Types of Data – Data Mining Functionalities – Interestingness of Patterns- Classification of Data Mining Systems – Data Mining Task Primitives-Pre-processing- Mining Frequent Patterns, Associations and Correlations – Mining Methods –Correlation Analysis – Constraint Based Association Mining.

UNIT III CLASSIFICATION AND PREDICTION **9 Hours**

Introduction – Decision Tree Induction – Bayesian Classification – Back propagation –Support Vector Machines- Lazy Learners – Other classification methods – Prediction.

UNIT IV CLUSTERING AND ASSOCIATION **9 Hours**

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

UNIT V ADVANCED TOPICS **9 Hours**

Web Mining – Web Content Mining – Structure and Usage Mining – Spatial Mining – Time Series and Sequence Mining – Graph Mining.

LIST OF EXPERIMENTS: **15 Hours**

1. Exercise on Data warehouse design for an enterprise
   a. Loading the dataset.
   b. Data pre-processing.
2. Exercise on Discovering Association Rules
   c. A-priori algorithm.
   d. FP growth algorithm.
3. Exercise on Classification Algorithms
   e. Bayesian classification.
   f. Decision tree.
   g. Support vector machine
4. Exercise on Clustering Algorithms
   h. K-means clustering.
   i. One Hierarchical clustering.
5. Exercises on Data mining tools
   j. Applications of classification for web mining.
   k. Case Study on Text Mining or any commercial application.

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SOFTWARE: WEKA, Rapid Miner, DB Miner, Python or Equivalent.

TOTAL: 60 HOURS

FURTHER READING:

Data Science &Data Classifications

COURSE OUTCOMES:

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

CO1: Explain the concepts of Data Warehousing architecture and implementation.
CO2: Apply the association rules for mining applications. Employability
CO3: Discuss on appropriate Classification/ Clustering techniques for various problems with high dimensional data. Entrepreneurship
CO4: Apply data mining techniques and methods to large data sets.
CO5: Use various data mining tools to solve different data sets

CO6: Compare and contrast the various classifiers and clusters
CO7: Illustrate various data mining techniques on complex data objects and advanced concepts

REFERENCES:

1. Jiawei. Han, MichelineKamber, "Data Mining: Concepts and Techniques", Second Edition, Elsevier, New Delhi, 2017.
2. Vipin Kumar, Michael Steinbach," Introduction to Data Mining", Second Edition, Addison Wesley, 2015.
3. Dunham M, —Data Mining: Introductory and Advanced Topics‖, Prentice Hall, New Delhi, 2013.
4. http://nptel.ac.in/

17021T604	WIRELESS COMMUNICATION	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Principles of Communications
2. Computer Networks.

COURSE OBJECTIVES:

1. Know the characteristic of wireless channel
2. Learn the various cellular architectures
3. Understand the concepts behind various digital signaling schemes for fading channels
4. Be familiar the various multipath mitigation techniques
5. Understand the various multiple antenna systems.

UNIT I WIRELESS CHANNELS **9 Hours**

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters- Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading

UNIT II CELLULAR ARCHITECTURE **9 Hours**

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking& grade of service – Coverage and capacity improvement – case study: Cellular Networks.

UNIT III MULTIPLE ANTENNA TECHNIQUES **9 Hours**

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels – Case Study: OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES **9 Hours**

Equalization – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception –Case Study: Rake receiver.

UNIT V MIMO SYSTEMS AND TRANSMISSIONS **9 Hours**

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming – transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 HOURS

FURTHER READING:

1. Wireless Sensor Networks.
2. Drone Assisted Networks

COURSE OUTCOMES: Employability

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

CO1: Characterize wireless channels
CO2: Design and implement various signaling schemes for fading channels
CO3: Design a cellular system
CO4: Compare multipath mitigation techniques and analyze their performance
CO5: Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance

REFERENCES:

1. Rappaport,T.S., "Wireless communications", Second Edition, Pearson Education, 2016.
2. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2015.
3. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2012.
4. UpenaDalal, "Wireless Communication", Oxford University Press, 2014.
5. Van Nee, R. and Ramji Prasad, "OFDM for wireless multimedia communications", Artech House, 2010.

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6. http://nptel.ac.in/

1704IT651	MOBILE APPLICATION DEVELOPMENT (MINI PROJECT II)	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. Java Programming.
2. Web Programming.

COURSE OBJECTIVES:

1. Introduce mobile application development tools
2. Design and develop useful mobile applications with compelling user interfaces
3. Create their own layouts and Views using Menus
4. Transfer apps to mobile.

a. Study of basics of mobile application development
   a. Introduction to Mobile Computing
   b. Introduction to
   c. Android Development Environment

b. Study of Factors in Developing Mobile Applications
   a. Mobile Software Engineering
   b. Frameworks and Tools
   c. Generic UI Development
   d. Android User

TO DEVELOP A MINI-PROJECT USING FOLLOWING PROBLEM STATEMENTS AND PROJECT SELECTION BASED ON REAL TIME AND SOCIAL ISSUES

1. Designing of UIs - VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI
2. Multichannel and Multimodial UIs
3. Study of Intents and Services - Android Intents and Services, Characteristics of Mobile Applications, Successful Mobile Development
4. Storing and Retrieving Data - Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider
5. Communications Via Network and the Web - State Machine, Correct Communications Model, Android Networking and Web
6. Telephony - Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony
7. Notifications and Alarms – Performance, Performance and Memory Management, Android Notifications and Alarms
8. Graphics - Performance and Multithreading, Graphics and UI Performance, Android Graphics
9. Multimedia - Mobile Agents and Peer-to-Peer Architecture, Android Multimedia
10. Location - Mobility and Location Based Services, Android
11. Putting It All Together - Packaging and Deploying, Performance Best Practices, Android Field Service App
12. Security and Hacking- Active Transactions, More on Security, Hacking Android
13. Platforms and Additional Issues - Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing

TOTAL:45 HOURS

REQUIREMENTS:

Android Studio or Eclipse or Equivalent

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1. Mobile App for Educational Institution
2. Mobile App for Industries

COURSE OUTCOMES

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

CO1: Understand the technology and business trends impacting mobile applications
CO2: Understand the characterization and architecture of mobile applications
CO3: Understand enterprise scale requirements of mobile applications
CO5: Design and develop mobile applications using one application development framework
CO6: Covert developed application to mobile

Skill Development
Employability

REFERENCES:

1. Jonathan McCallister, Mobile Apps Made Simple: The Ultimate Guide to Quickly Creating, Designing and Utilizing Mobile Apps for Your Business - 2nd Edition, March 2015
2. Dan Hermes, Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms

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Fundamentals, 2017
3. Ryan Cohen, Android Application Development for the Intel Platform, 2011
4. Valentino Lee, Mobile Applications: Architecture, Design, and Development: Architecture, Design, and Development, 2017

1704GE651	LIFE SKILLS: APTITUDE – II	L	T	P	C
		0	0	2	1

PREREQUISITE :
Life Skills: Aptitude - I

COURSE OBJECTIVES:

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

UNIT I PARTNERSHIP, MIXTURES AND ALLEGATIONS, PROBLEM ON AGES, SIMPLE INTEREST, COMPOUND INTEREST **6 Hours**

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

UNIT II BLOOD RELATIONS, CLOCKS, CALENDARS **6 Hours**

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

UNIT III TIME AND DISTANCE, TIME AND WORK **6 Hours**

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

UNIT IV DATA INTERPRETATION AND DATA SUFFICIENCY **6 Hours**

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

UNIT V ANALYTICAL AND CRITICAL REASONING **6 Hours**

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

Total: 30 Hours

COURSE OUTCOMES: Employability / Skill Development

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

CO1: Solve problems on Partnership, Mixture & Allegation and ages least time using shortcuts and apply real life situations.
CO2: Workout family relationships concepts, ability to visualize clocks & calendar and understand the logic behind a Sequence.
CO3: Calculate concepts of speed, time and distance, understand timely completion using time and work.
CO4: Learners should be able to understand various charts and interpreted data least time.
CO5: Workout puzzles, ability to arrange things in an orderly fashion

REFERENCES:

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

1704IT652	**INDUSTRIAL VISIT PRESENTATION**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

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

ASSESSMENT PATTERN :

Continuous Assessment (100 Marks)

Distribution of marks for Continuous Assessment	**Marks**
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Total	**100**

Grades (Excellent / Good / Satisfactory / Not Satisfactory)

Employability / Skill Development / Entrepre

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1703MG002	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

AIM: The aim of this course is to address broad and general guideline that regulates decision making and behavior within a group or organization

COURSE OBJECTIVES:

1. To enable the students to study the evolution of Management
2. To relate, discuss, understand and present management principles, process and procedures.
3. To knowledge and understanding of the principles of management will enable the student manager or employee

UNIT I	INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS	9 Hours

Definition of Management – Science or Art – Manager Vs Entrepreneur - Types of managers - managerial roles and skills – Evolution of Management – Scientific, Human relations , System and contingency approaches.

UNIT II	PLANNING	9 Hours

Nature and purpose of planning – Planning Process – Types of planning – Objectives – Setting objectives – policies – Planning premises – Planning Tools and Techniques – Decision making steps and process.

UNIT III	ORGANISING	9 Hours

Nature and purpose – Formal and informal organization – Organization chart – Organization structure – Types – Line and staff authority – Departmentalization – Delegation of authority – Centralization and Decentralization – Job Design.

UNIT IV	DIRECTING	9 Hours

Foundations of Individual and Group behaviour – Motivation – Motivation theories – Motivational techniques – Job satisfaction – Job enrichment – Leadership – Types and theories of leadership – Communication – Process of communication – Barrier in communication – Effective communication –Communication and IT

UNIT V	CONTROLLING	9 Hours

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting

TOTAL:	45 Hours

FURTHER READING: Decision roles of manager, Motivational thoughts.

COURSE OUTCOMES Employability

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

CO1: Explain the elements of Management and Organization.
CO2: Summarize the types, policies, tools and techniques in Planning in Management
CO3: Relate the job design and human resource management in Organizing
CO4: Illustrate the skills of leadership and communication
CO5: Interpret the controlling techniques in Management

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REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7 th Edition, Pearson Education, 2011.
2. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill 1998.
3. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra, 2008.
4. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6 th Edition, Pearson Education, 2004.
5. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999

1703IT013	SOFTWARE ARCHITECTURES	L	T	P	C
		3	0	0	3

AIM: The main objective of this course to understand Concepts and methodologies for the systematic analysis, development, evolution, and reuse of software architectural design, styles, elements and connectors.

PREREQUISITE: Software Engineering

COURSE OBJECTIVES:

1. Understand architectural requirements
2. Identify architectural structure
3. Develop architectural documentation
4. Generate architectural alternatives
5. Evaluate the architecture against the drivers

UNIT I	ARCHITECTURAL DRIVERS	9 Hours

Introduction – Standard Definitions of Software Architecture– Architectural structures – Architecture Business Cycle – Quality Attribute Workshop (QAW) – Documenting Quality Attributes – Six part scenarios

UNIT II	ARCHITECTURAL VIEWS AND DOCUMENTATION	9 Hours

Introduction – Standard Definitions for views – Structures and views– Representing views-available notations – Good practices in documentation– Documenting the Views using UML – Need for formal languages - Architectural Description Languages – ACME

UNIT III	ARCHITECTURAL STYLES	9 Hours

Introduction – Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style

UNIT IV	ARCHITECTURAL DESIGN	9 Hours

Approaches for architectural design – System decomposition – Attributes driven design – Architecting for specific quality attributes – Performance, Availability – Security – Architectural conformance.

UNIT V	ARCHITECTURE EVALUATION AND SOME SPECIAL TOPICS	9 Hours

Need for evaluation – Scenario based evaluation against the drivers – ATAM and its variations – Case studies in architectural evaluations – SOA and Web services – Cloud Computing – Adaptive structures

TOTAL:	**45 Hours**

FURTHER READING: Working with Open Source Platforms

COURSE OUTCOMES

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

CO1: Explain key architectural drivers — Skill Development

CO2: Explain the influence of architecture on business and technical activities

CO3: Identify key architectural structures

CO4: Adopt good practices for documenting the architecture

CO5: Explain how to use formal languages to specify architecture — Entrepreneurship

CO6: Describe the recent trends in software architecture — Employability

REFERENCES:

1. Len Bass, Paul Clements, and Rick Kazman, "Software Architectures Principles and Practices", 2n Edition, Addison-Wesley, 2016.
2. Anthony J Lattanze, "Architecting Software Intensive System. A Practitioner's Guide", Auerbach Publications, 2013.
3. Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford, "Documenting Software Architectures. Views and Beyond", 2nd Edition, Addison-Wesley, 2012.
4. David Garlan and Mary Shaw, "Software architecture: Perspectives on an emerging discipline", Prentice Hall, 2011.
5. Mark Hansen, "SOA Using Java Web Services", Prentice Hall, 2013.
6. David Garlan, Bradley Schmerl, and Shang-Wen Cheng, "Software Architecture-Based Self-Adaptation," 31-56. Mieso K Denko, Laurence Tianruo Yang, and Yan Zang (eds.), "Autonomic Computing and Networking". Springer Verlag, 2014.
7. http://nptel.ac.in/

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

PREREQUISITE:

1. Basic understanding of business management
2. Basic understanding of human values

COURSE OBJECTIVES:

1. To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
2. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
3. To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights
4. To have an adequate knowledge about MNC"s, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.
5. To use the engineering principles to update and maintain the technical skills.

UNIT I ENGINEERING ETHICS — **9 Hours**

Senses of „Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

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

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY — **9 Hours**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator"s Approach to Risk - Case Studies on Chernobyl, Bhopal MIC and Sterlite copper.

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

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES — **9 Hours**

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Case study on Hiroshima and Nagasaki

COURSE OUTCOMES: Skill Development

At the end of this course, Students will be able to,

CO1: Articulate engineering ethics theory with sustained lifelong learning to strengthen autonomous engineering decisions.

CO2: Fortify the competency with facts and evidences to responsibly confront moral issues raised by technological activities, and serve in responsible positions of leadership.

CO3: Contribute to shape a better world by taking responsible and ethical actions to improve the environment and the lives of world community.

CO4: Be an example of faith, character and high professional ethics, and cherish the workplace responsibilities, rights of others, public's welfare, health and safety.

CO5: Be Proficient in analytical abilities for moral problem solving in engineering situations through exploration and assessment of ethical problems supported by established experiments.

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi 2004

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5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)
6. Nptel link: https://nptel.ac.in/courses/109/106/109106117/

1702IT701 **DATA ANALYTICS**

L	T	P	C
3	2	0	4

AIM: The main objective of this course is to provide practical foundation level training that enables immediate and effective participation in big data and other Analytic projects

PREREQUISITES: Data warehouse and Data mining

COURSE OBJECTIVES:

1. Deploying the Data Analytics lifecycle to address big data analytics projects.
2. Reframing a business challenge as an analytics challenge
3. Applying appropriate analytic techniques and tools to analyze big data.
4. Selecting appropriate data visualizations to clearly communicate analytic insights to business sponsors and analytic audiences.
5. Using tools such as: R and R-Studio, Map Reduce /Hadoop in database analytics.

UNIT I INTRODUCTION **12 Hours**

Introduction to Data Science – Data Classification – Data Analytics - Big data overview – characteristics of Big data – the practice of analytics – the role and required skills of data scientist..

UNIT II DATA ANALYTICS LIFECYCLE **12 Hours**

Discovery – Data preparation – model planning and building – communicating results – operation alizing a data analytics project.

UNIT III DATA ANALYTICS METHOD USING R **12 Hours**

Introduction to R - Using basic R commands to analyze data – statistical measures and visualization to understand data – Practical: RStudio basic commands.

UNIT IV MAP REDUCE AND ITS FRAMEWORK **12 Hours**

Introduction to Map Reduce – Hadoop ecosystems – SQL OLAP extensions, windows functions, user defined functions and aggregates – MADlib.

UNIT V ADVANCED DATA ANALYTICS **12 Hours**

Classification and prediction technique using R – Time Series analysis – Text Analytics - clustering and association technique using R – web mining – graph mining

TOTAL: 60 Hours

FURTHER READING Deep Learning, Augmented Learning

COURSE OUTCOMES:

At the end of this course, Students will be able to

CO1: Explain the roles of Big data Analytics
CO2: Illustrate Hadoop Distributed File System and its components
CO3: Use data analytics tools to solve Map and reduce problems
CO4: Construct different format of data model using map reduce split up functions
CO5: Use various Streaming tools in Big Data Analytics problems

REFERENCES:

1. ICTACT "Data science and big data analytics ", EMC2 edition 2016
2. Noreen Burlingame, Little Book of Big Datal Kindle Edition.2015
3. Tom White, Hadoop the definitive Guidel, O'Reilly Media yahoo Press, 2nd Edition,2012
4. Alex Holmas, Hadoop in Practicel, Manning Publications, 2012.
5. https://www.openstack.org/
6. http://nptel.ac.in

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1702IT702	SECURITY IN COMPUTING	L	T	P	C
		3	0	2	4

PREREQUISITE:

Computer Networks, Java Programming

COURSE OBJECTIVES:

1. Understand the concepts of public key encryption and number theory
2. Understand authentication and hash functions.
3. Know the network security tools and applications.
4. Understand the system level security used.

UNIT I INTRODUCTION **9 Hours**

Motivating examples– Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, assurance –Basic Cryptography: Historical background, –Elementary Ciphers (Substitution, Transposition and their Properties) –Caesar Cipher– Data Encryption Standard – Block Cipher Design Principles and Modes of Operation – Case study: AES.

UNIT II PUBLIC KEY CRYPTOGRAPHY **9 Hours**

Euclidean algorithm –Euler Theorem– Fermat Theorem– Totent functions– multiplicative and additive inverse – Selection of public and private keys–Case Study: Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography - Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography – Case Study: RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION **9 Hours**

Security Handshake pitfalls–Online vs. offline password guessing–Reflection attacks Per-session keys and authentication tickets–Key distribution centers and certificate authorities Authentication requirements – Authentication functions – Message Authentication Codes– Hash Functions – Case Study: MD5, HMAC.

UNIT IV NETWORK SECURITY AND FIREWALLS **9 Hours**

Public Key infrastructures– IPSec - IKE– SSL/TLS - Authentication Application: X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security – Kerberos - Packet filters– Application level gateways– Encrypted tunnels.

UNIT V HACKING **9 Hours**

Introduction to Hacking – Hacking Process – Foot printing – System Hacking – Trojan Horses – Ethical Hacking – Attacks and Countermeasures.

LIST OF EXPERIMENTS: **15 Hours**

1. Implement the following Substitution & Transposition Techniques concepts
2. Implement the following algorithms a) DES b) RSA Algorithm c) Diffie-Hellman d) MD5 e) SHA-1
3. 3 Implement the Signature Scheme - Digital Signature Standard
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the Honeypot on network (KF Sensor)
6. Installation of Rootkits and study about the variety of options
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
8. Demonstrate intrusion detection system (IDS) using any tool (snort or any other s/w)
9. Apply different hacking techniques and counter measures to solve various problems

SOFTWARE REQUIREMENTS: Java Compiler, GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cyber Forensics, Security Management issues

COURSE OUTCOMES: Employability

After the end of this course, student will be able to.

CO1: Explain concepts related to applied cryptography, including symmetric cryptography, asymmetric cryptography, and digital signatures

CO2: Understand the theory behind the security of different cryptographic algorithms.

CO3: Understand common network vulnerabilities, defense mechanisms against network attacks, and

cryptographic protection mechanisms.

CO4: Apply the requirements of non-real time security (email security) and ways to provide privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, and anonymity

REFERENCES:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Pearson Education, Third Edition, 2016
2. Charlie Kaufman, Radia Perlman, and Mike Speciner, " Network Security: PRIVATE Communication in a PUBLIC World", Prentice Hall, ISBN 0-13-046019-2, 2017
3. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2013
4. Bruce Schneier, "Applied Cryptography", John Wiley & Sons, Inc, 2013.
5. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2012
6. Wade Trappe and Lawrence C. Washington , " Introduction to Cryptography withcoding theory" , Pearson Education, 2012.
7. Thomas Calabrese, "Information Security Intelligence : Cryptographic Principles andApplications", Thomson Delmar Learning,2012.
8. http://nptel.ac.in//

1703IT703	CLOUD INFRASTRUCTURE AND COMPUTING	L	T	P	C
		3	0	2	4

PREREQUISITE:

1. Distributed Computing
2. Data Mining and Data Warehousing

COURSE OBJECTIVES:

1. Introduce the broad perceptive of cloud architecture and model
2. Understand the concept of Virtualization
3. Be familiar with the lead players in cloud.
4. Apply different cloud programming mode as per need
5. Understand the design of cloud Services.

UNIT I CLOUD ARCHITECTURE AND GRID SERVICE MODEL **9 Hours**

Technologies for Network-Based System – System Models for Distributed and Cloud Computing Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS)– OGSA architecture.

UNIT II VIRTUALIZATION **9 Hours**

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization- Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O devices - Virtualization for Data-center Automation.

UNIT III CLOUD INFRASTRUCTURE **9 Hours**

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture- Development – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL **9 Hours**

Globus Toolkit (GT4) Architecture – MapReduce, – Hadoop Library from Apache - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula. OpenStack.

UNIT V SECURITY IN THE CLOUD **9 Hours**

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security — Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

LIST OF EXPERIMENTS: **15 Hours**

1. Introduction to cloud computing.
2. Creating a Warehouse Application in SalesForce.com.
3. Implementation of Para-Virtualization using VM Ware,,s Workstation/ Guest O.S.
4. Installation and Configuration of Hadoop.
5. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
6. Securing Servers in Cloud.
7. Case Study: PAAS(Facebook, Google App Engine), Amazon Web Services.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cyber Forensics, Security Management issues

COURSE OUTCOMES: Employability

After the end of this course, student will be able to.

CO1: Develop different Cloud Computing architecture, infrastructure and delivery models using cloud services
CO2: Build different virtual machines using their types, tools and operations at storage, network and compute levels
CO3: Deploy various virtual machines using various cloud platforms
CO4: Deploy various programming model to implement cloud infrastructure and platform
CO5: Design a real time cloud models using cloud security services

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2016.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2012.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2013.
4. Kumar Saurabh, "Cloud Computing – insights into New-Era Infrastructure", Wiley India, 2011.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly, 2015
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer, 2015
7. Rajkumar Buyya, Christian Vecchiola, S.TamaraiSelvi, „Mastering Cloud Computing", TMGH, 2014.
8. http://nptel.ac.in//

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17041T751	SOFTWARE DEVELOPMENT (MINI PROJECT III)	L	T	P	C
		0	0	2	1

PREREQUISITE :

1. CASE Tools
2. Application Development (Web and Mobile Apps)
3. Software Engineering and Project Management

COURSE OBJECTIVES:

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

TO DEVELOP A MINI-PROJECT USING FOLLOWING PROBLEM STATEMENTS AND PROJECT SELECTION BASED ON REAL TIME AND SOCIAL ISSUES

1. Automation Anywhere
2. Inventory Control
3. Course Registration
4. Online Mentoring
5. Web Crawling and App development
6. Data Centre and Virtualization
7. Cyber Security in Information and Communication Engineering
8. Online Token Passing Systems
9. Course Assessment and Attainment Processing Systems
10. MOOC and Online Learning platforms

Not limited too.

Course Outcomes: Employability, Entrepreneurship, Skill Development

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

CO1: Formulate a real world problem, identify the requirement and develop the design solutions.
CO2: Express the technical ideas, strategies and methodologies.
CO3: Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
CO4: Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
CO5: Prepare report and present the oral demonstrations.

TOTAL:45 HOURS

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

COURSE OBJECTIVES:

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

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

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

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

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

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

Computer Networks: Layering – Categories – Topology - Flow and Error control techniques – Switching - IPv4/IPv6 - Routing - TCP – UDP - Application layer protocols – Bluetooth - Wi-Fi - Network security – Firewalls - Digital signatures and certificates.

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

Total: 30 Hours

ASSESSMENT PATTERN :

Marks (Continuous Assessment Only)

Test I 25
Test II 25
Final Examination 50

Total Marks 100

COURSE OUTCOMES: Skill Development

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

CO1: Explore the concepts of data structures, algorithms and computer architecture.
CO2: Elucidate the concepts of operating systems and designing compilers.
CO3: Explain the concepts of networks and manage databases

REFERENCES:

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

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1704IT754 IN PLANT / INTERNSHIP TRAINING PRESENTATION L T P C

0 0 0 1

In order to provide the experiential learning to the students, the students undergo in-plant training or internship during summer / winter vacation between III and VII semesters. A presentation based on in-plant training / internship shall be made in this semester and suitable credit may be awarded

Skill Development, Employability, Entrepreneurship

Internal Assessment Only	
Test	40
Presentation / Quiz / Group Discussion	40
Report	20

1703IT015	INFORMATION MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE: Distributed Computing, Cloud Computing

COURSE OBJECTIVES:

1. To expose students with the basics of managing the information
2. To explore the various aspects of database design and modeling.
3. To examine the basic issues in information governance and information integration
4. To understand the overview of information architecture

UNIT I	DATABASE MODELLING, MANAGEMENT AND DEVELOPMENT	9 Hours

Database design and modeling - Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL - Hadoop HDFS, Map Reduce, Hive, and enhancements.

UNIT II	DATA SECURITY AND PRIVACY	9 Hours

Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

UNIT III	INFORMATION GOVERNANCE	9 Hours

Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management

UNIT IV	INFORMATION ARCHITECTURE	9 Hours

Principles of Information architecture and framework, Organizing information, Navigation systems and Labeling systems, Conceptual design, Granularity of Content.

UNIT V	INFORMATION LIFECYCLE MANAGEMENT	9 Hours

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration.

TOTAL: 45 Hours

COURSE OUTCOMES Employability

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

CO1: Cover core relational database topics including logical and physical design and modeling

CO2: Design and implement a complex information system that meets regulatory requirements; define and manage an organization's key master data entities

CO3: Design, Create and maintain data warehouses.

CO4: Learn recent advances in NoSQL , Big Data and related tools

REFERENCES:

1. Alex Berson, Larry Dubov Master Data Management and Data Governance, 2/E, Tata McGraw Hill, 2015
2. Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2013
3. Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly

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Media;2011
4. Jeffrey A. Hoffer, Heikki Topi, V Ramesh - Modern Database Management, 10 Edition, Pearson, 2012
5. http://nosql-database.org/ Next Gen databases that are distributed, open source and scalable.
6. http://ibm.com/big-data - Four dimensions of big data and other ebooks on Big Data Analytics
7. Inside Cyber Warfare: Mapping the Cyber Underworld- Jeffrey Carr, O'Reilly Media; Second Edition 2011
1.http://nptel.ac.in

1703MG001	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

AIM: The aim of this course is to address the need for skilled professionals who can contribute effectively towards Quality Management to engage the participants on contemporary issues pertaining to the management of quality in both services and manufacturing industries

COURSE OBJECTIVES:

1. To learn concepts, dimension quality and philosophies of TQM.
2. To study the TQM principles and its strategies.
3. To impart knowledge on TQM tools for continuous improvement

UNIT I INTRODUCTION — **9 Hours**

Definition of Quality - Dimensions of Quality - Quality Planning - Quality costs - Analysis Techniques for Quality Costs - Basic concepts of Total Quality Management - Historical Review - Quality Statements - Strategic Planning, Deming Philosophy - Crosby philosophy - Continuous Process Improvement - Juran Trilogy, PDSA Cycle, 5S, Kaizen - Obstacles to TQM Implementation

UNIT II TQM PRINCIPLES — **9 Hours**

Principles of TQM, Leadership - Concepts - Role of Senior Management - Quality Council, Customer satisfaction - Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement - Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits - Supplier Partnership - Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures - Basic Concepts, Strategy, Performance Measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) — **9 Hours**

The seven tools of quality - Statistical Fundamentals - Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables X bar and R chart and attributes P, NP, C, and u charts, Industrial Examples, Process capability, Concept of six sigma - New seven Management tools

UNIT IV TQM TOOLS — **9 Hours**

Benchmarking - Reasons to Benchmark - Benchmarking Process, Quality Function Deployment (QFD)- House of Quality, QFD Process, and Benefits - Taguchi Quality Loss Function - Total Productive Maintenance (TPM) - Concept, Improvement Needs, and FMEA - Stages of FMEA

UNIT V QUALITY SYSTEMS — **9 Hours**

Concept, Requirements of ISO 9000 and Other Quality Systems - ISO 9000:2000 Quality System - Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 9000:2005 and 9001:2015, ISO 14000.

TOTAL: 45 Hours

FURTHER READING: Case Study: TQM Quality and Environmental Concepts in real World Applications, Environment Management system

COURSE OUTCOMES

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

CO1: Understand the concepts, dimension quality and philosophies of TQM.
CO2: Understand the principles of TQM and its strategies. Skill Development
CO3: Apply seven statistical quality and management tools Employability
CO4: Understand TQM tools for continuous improvement.
CO5: Understand the Quality Management system Entrepreneurship

REFERENCES:

1. Dale H.Bester filed, Total Quality Management, Pearson Education Inc., New Delhi, 2003.
2. N. Gupta and B. Valarmathi, Total Quality Management, Tata McGraw-Hill Publishing Company Pvt. Ltd., New Delhi, 2009.
3. P.N. Muherjee, Total Quality Management, Prentice Hall of India, New Delhi, 2006.
4. James R. Evans and William M. Lidsay, The Management and Control of Quality, South-Western 2002.
5. S. Kumar, Total Quality Management, Laxmi Publications Ltd. New Delhi, 2006

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1704IT851 **PROJECT WORK**

L	T	P	C
0	0	18	9

Course Objectives:
The student should be made to: Skill Development, Employability, Entrepreneur

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

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

TOTAL: 180 Hours

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1703IT019	CYBER FORENSICS	L	T	P	C
		3	0	0	3

AIM: This course will understand and learn various cyber forensics and security techniques in real time environment

COURSE OBJECTIVES:

1. Learn the security issues network layer and transport layer
2. Be exposed to security issues of the application layer
3. Learn computer forensics
4. Be familiar with forensics tools
5. Learn to analyze and validate forensics data

UNIT I	NETWORK LAYER AND TRANSPORT LAYER SECURITY	9 Hours

Network layer security: IPSec Protocol – IP Authentication Header – IP ESP –Key Management Protocol for IPSec– Transport layer Security: SSL protocol–Cryptographic Computations – TLS Protocol.

UNIT II	E-MAIL SECURITY & FIREWALLS	9 Hours

PGP– S/MIME– Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology–Types of Firewalls –Firewall designs – SET for E-Commerce Transactions

UNIT III	COMPUTER FORENSICS	9 Hours

Traditional Computer Crimes–Problems associated with Computer Crime–Identity Theft & Identity Fraud– Types of CF techniques –Incident and incident response methodology – Forensic duplication and investigation– Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

UNIT IV	EVIDENCE COLLECTION AND FORENSICS TOOLS	9 Hours

Processing Crime and Incident Scenes – Working with Windows and DOS Systems– Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT V	ANALYSIS AND VALIDATION	9 Hours

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

TOTAL: 45 Hours

COURSE OUTCOMES: Employability

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

CO1: Discuss the security issues network layer and transport layer
CO2: Apply security principles in the application layer
CO3: Explain computer forensics tools
CO4: Understand the evidence collection and use forensic tools
CO5: Analysis and Validate various forensics data

REFERENCES:

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2014.
2. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2012
3. John R.Vacca, "Computer Forensics", Cengage Learning, 2013
4. Richard E.Smith, "Internet Cryptography", 3rd Edition Pearson Education, 2012.
5. MarjieT.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3rd Edition, Prentice Hall, 2013.

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1703IT025	SOFTWARE QUALITY ASSURANCE	L	T	P	C
		3	0	0	3

AIM: The main objective of this course is used to introduce the concepts of software Quality and Quality Management in IT sector

PREREQUISITE: Software Engineering and Project Management

COURSE OBJECTIVES:

1. Understand the basic tenets of software quality and quality factors.
2. Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.
3. Understand of how the SQA components can be integrated into the project life cycle.
4. Be familiar with the software quality infrastructure.
5. Be exposed to the management components of software quality.

UNIT I	INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE	9 Hours

Need for Software quality – Quality challenges – Software quality assurance (SQA) – Software quality factors- McCall"s quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.

UNIT II	SQA COMPONENTS AND PROJECT LIFE CYCLE	9 Hours

Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.

UNIT III	SOFTWARE QUALITY INFRASTRUCTURE	9 Hours

Procedures and work instructions - Templates - Checklists – 3S developmenting - Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.

NIT IV	SOFTWARE QUALITY MANAGEMENT & METRICS	9 Hours

roject process control – Computerized tools - Software quality metrics – Objectives of quality measurement – rocess & Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical ality cost model – Extended model – Application of Cost model.

NIT V	STANDARDS, CERTIFICATIONS & ASSESSMENTS	9 Hours

uality management standards – ISO 9001 and ISO 9000-3 – CMM and CMMI assessment methodologies - ootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization Quality Assurance – Department management responsibilities – Project management responsibilities – SQA ts and other actors in SQA systems

	TOTAL:	45 Hours

URSE OUTCOMES: Employability

he end of this course, students will be able to,

CO1: Utilize the concepts in software development life cycle.

CO2: Demonstrate their capability to adopt quality standards.

CO3: Assess the quality of software product.

CO4: Apply the concepts in preparing the quality plan & documents.

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FERENCES:

1. Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.
2. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 2012.
3. Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", International Thompson Computer Press, 2012.
4. http://nptel.ac.in

1703IT027	DEEP LEARNING New	L	T	P	C
		3	0	0	3

AIM: To study the concepts of Deep Learning process and analytics procedures

PREREQUISITE: Data Warehousing And Data Mining, Artificial Intelligence

COURSE OBJECTIVES:

1. Teach the concepts of deep learning process
2. Study the deep learning Strategies 1 and 2
3. Study of various learning and classification techniques
4. Study of various real time case studies of deep learning process

UNIT I	INTRODUCTION	9 Hours

Review of Artificial Intelligence – Neural Networks – Supervised Learning – Back Propagations

UNIT II	DEEP LEARNING STRATEGIES - 1	9 Hours

Properties of CNN representations: inevitability, stability, invariance – Localization – Regression - RNNs

UNIT III	DEEP LEARNING STRATEGIES - 2	9 Hours

Deep Unsupervised Learning – Auto encoders (standard, de-noising, contractive, etc etc) - Variation Auto encoders - Adversarial Generative Networks - Maximum Entropy Distributions

UNIT IV	LEARNING AND CLASSIFICATION	9 Hours

Reinforced Learning – Learning Agents – Binary Classification – Multi Class Classification - CNN Classification – Deep Belief – Computer Vision

UNIT V	CASE STUDY	9 Hours

Medical Imaging – Natural Language Processing - Speech Processing – Secure Online Processing – Fraud Detection – Cyber Forensics

TOTAL: 45 Hours

COURSE OUTCOMES: Employability

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

CO1: Understand the concept of deep learning
CO2: Explain different representation and strategies of deep learning
CO3: Explain various unsupervised deep learning techniques and networks
CO4: Understand learning and classification techniques
CO5: Demonstrate various case studies of deep learning applications

REFERENCES:

1. Daniel Graupe, "Deep Learning Neural Networks and Case Studies", World Scientific Publishing Co. Pt. Ltd, 2016
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series)", MIT Press, 2017
3. Nikhil Buduma, Nicholas Locascio Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, O'Reilly Media; 1 edition, 2017
4. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly Media; 1 edition, 2017
5. Russell Reed (Author), Robert J Marks II, Neural Smithing: Supervised

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