

1901MA102

MATHEMATICS – I
(Calculus and Linear Algebra)
(CSE, IT)

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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: Differential 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, dimensions; 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)

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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 chemoinformatics 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](https://en.wikipedia.org/wiki/Ramachandran_lot)
8. Wiki online sources

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Page | 3

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

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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 INTRODUCTION TO PROGRAMMING 9 Hours
Components of Computers and its Classifications - Problem Solving Techniques - Algorithm - Flowchart - Pseudo code - Program - Compilation - Execution 9 Hours

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. 9 Hours

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 Program, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, 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)

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3 0 0 3

1901GEX03

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Example Program: Swapping of two numbers and changing the value of a variable using pass by reference 9 Hours

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-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

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CO3: Describe about basic concepts of C-Language

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2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India Pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
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1901ENX01

ENGLISH FOR ENGINEERS
(Common for all B.E./B.Tech. Programme)

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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 planned 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

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.

1901GEN52

COMPUTER PROGRAMMING LAB
(Common for all B.E./B.Tech. Programme)

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List of Experiments:

Skill Development, Employability

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 ProgramI, Seventh edition, Pearson Publication
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, 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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1901GE151

ENGINEERING INTELLIGENCE I
(Common for all B.E./B.Tech. Programme)

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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-I 6 Hours

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

TOTAL: 30 HOURS

Course Outcomes:

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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1901CIIX51

ENGINEERING CHEMISTRY LAB
(Common for all B.E./B.Tech. Programme)

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List of Experiments:

Skill Development, Employability

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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| | COMMUNICATION SKILLS LAB | L | T | P | C |
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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 :

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|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| I | Activities on Fundamentals of <u>Listening and Inter-personal Communication</u> | 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 | <u>Activities on Writing Skills</u> | 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.

6 Hours

V **Activities on Soft Skills**

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, pre-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.
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- CO6: Monitor, analyse and adjust their own communication.

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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.
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1901MA202

ENGINEERING MATHEMATICS-II

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

PREREQUISITES: Statistics and Probability

COURSE CONTENTS

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

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

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

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

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

Total Hours: 60

COURSE OUTCOMES:

skill development

Upon completion of this course, students will be able to

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

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

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

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

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

REFERENCES BOOKS:

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

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| 1901PH201 | PHYSICS FOR INFORMATION SCIENCE | L 3 | T 0 | P 0 | C 3 |
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Aim: To make students understand the semiconductor physics and their applications in computer science and engineering

MODULE I ELECTRONIC MATERIALS

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.

9 Hours

MODULE II SEMICONDUCTORS

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).

9 Hours

MODULE III MAGNETIC PROPERTIES OF MATERIALS

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).

9 Hours

MODULE IV OPTICAL PROPERTIES OF MATERIALS

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.

9 Hours

MODULE V NANO DEVICES

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.

9 Hours

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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| 1901GEX01 | BASIC ELECTRICAL AND ELECTRONICS ENGINEERING | L | T | P | C |
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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

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.

7 Hours

6 Hours

MODULE II ELECTRICAL MACHINES

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

6 Hours

MODULE III MEASURING INSTRUMENTS

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

7 Hours

MODULE IV SEMICONDUCTOR DEVICES

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).

6 Hours

MODULE V DIGITAL SYSTEMS

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

6 Hours

MODULE VI COMMUNICATION SYSTEMS

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.

7 Hours

MODULE VII ELECTRICAL SAFETY AND WIRING

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.

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| 1901GEX02 | ENGINEERING GRAPHICS | L | T | P | C |
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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.

MODULE II 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.

MODULE III 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.

MODULE IV 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:

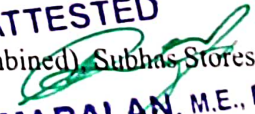
Skill Development

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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- 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.
- Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2015.
- Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2017.
- Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2015.
- Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
- Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2016.

1901GE201

ENGINEERING EXPLORATION

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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 Stream 4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-making 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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1901GEX51

CAD (COMPUTER AIDED DRAFTING) LAB

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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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1901GEN53

**BASIC ELECTRICAL AND ELECTRONICS
ENGINEERING LABORATORY**

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List of Experiments: Skill Development

1. Experiments related to verification of Ohm's law and Kirchlhoff'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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ENGINEERING PHYSICS LAB

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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)

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UNIT I FOURIER SERIES

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

Skill Development 12 Hours

UNIT II FOURIER TRANSFORMS

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

12 Hours

UNIT III QUEUEING MODELS

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.

12 Hours

UNIT IV NETWORK MODEL

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

12 Hours

UNIT V TRANSPORTATION AND ASSIGNMENT MODELS

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

12 Hours

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. Taha H.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’s Algorithms – Binomial Coefficient | 9 Hours |
| UNIT IV | GREEDY AND ITERATIVE METHODS | |
| | Prim’s Algorithm – Kruskal’s Algorithms – Dijkstra’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 to Algorithms”, 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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| 190211351 | DATA STRUCTURES AND ALGORITHMS LAB | L | T | P | C |
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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 Hanoi 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

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| 1902IT302 | COMPUTER ORGANIZATION AND ARCHITECTURE | L | T | P | C |
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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.

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| 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 Unsigned numbers, Representing Instructions in the Computer, Logical Operations, Instructions for Making Decisions, 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 passing multiprocessors-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", Morgan Kaufman / Elsevier, Fifth edition, 2005.

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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 Performance, Sixth Edition, Pearson Education, 2013.
4. V.P. Heuring, H.F. Jordan, —Computer Systems Design and Architecture, Second Edition, Pearson Education, 2015.
5. Behrooz Parhami, —Computer Architecture, Oxford University Press, 2012.
6. <http://nptel.ac.in>

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| 1902IT303 | DIGITAL PRINCIPLES AND DESIGN | L | T | P | C |
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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 idea about designs using PLDs, and writing codes for designing larger digital systems. **9 Hours**

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES

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. **9 Hours**

UNIT II COMBINATIONAL LOGIC

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. **9 Hours**

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC

Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits. **9 Hours**

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards **9 Hours**

UNIT V MEMORY AND PROGRAMMABLE LOGIC

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 – Jaipee 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>

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| 1902IT352 | DIGITAL PRINCIPLES AND DESIGN LAB | L | T | P | C |
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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

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| | TOTAL: | 30 HOURS |
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| 1902IT304 | PROBLEM SOLVING USING PYTHON | L | T | P | C |
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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 **9 Hours**

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,

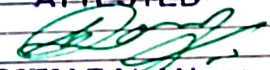
- CO1 : Execute Python code in variety of environments
- CO2 : Use the correct Python control flow construct
- CO3 : Design Data structures and functions using python
- CO4 : Implement File, Modules and Packages concepts using Python
- CO5 : Create their own classes and use existing python classes

FURTHER READING: Python for Data Science

REFERENCES:

1. Martin. C. Brown, "PYTHON: The Complete Reference", McGraw-Hill, 2010
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 Python 3.2, Network Theory Ltd., 2011.
4. John V Guttag, —Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Allen B. Downey , "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
(<http://greenteapress.com/wp/thinkpython/>)

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| 1902IT353 | PYTHON PROGRAMMING LAB | L | T | P | C |
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- List of Experiments:** Skill Development, Employability
- Study of key features of the Python language, intro to the Python IDE's
 - Play with Data types, keywords, conditional and control statements, looping, branching
 - Implement Python program concepts using List, Tuple and Dictionaries
 - Implement Functions using Python
 - Perform the following file operations using Python
 - 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.
 - Read a file content and copy only the contents at odd lines into a new file.
 - Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
 - Perform Sorting and Searching using Python
 - Perform the following file operations using Python
 - 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.
 - Read a file content and copy only the contents at odd lines into a new file
 - Perform exception handling using Python
 - Implement Python programming concepts using classes and objects
 - Using Regular Expressions, develop a Python program to
 - Identify a word with a sequence of one upper case letter followed by lower case letters.
 - Find all the patterns of "1(0+)1" in a given string.
 - Match a word containing 'z' followed by one or more o's. Prompt the user for input.
 - Devise a Python program to implement the Hangman Game.
 - 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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| Online Resource: | TOTAL: 30 HOURS |
| https://www.learnpython.org/ | E.G.S. Pillay Engineering College, |
| https://wiki.python.org/moin/BeginnersGuide/Programmers | Thethi, Nagore - 611 002. |
| https://www.python.org/about/gettingstarted/ | Nagapattinam (Dt) Tamil Nadu. |
| https://www.javatpoint.com/python-tutorial | |
| https://www.geeksforgeeks.org/python-programming-language/ | |

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| 1901GEX04 | BIOLOGY FOR ENGINEERS | L | T | P | C |
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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**
- Describe how biological observations of 18th Century that lead to major discoveries.
 - Classify biology based on morphological, biochemical and ecological matters
 - Describe the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
 - Analyze biological processes at the reductionistic level
 - Describe about all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
 - Classify enzymes and distinguish between different mechanisms of enzyme action.
 - Describe DNA as a genetic material in the molecular basis of information

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| | 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, uricotelic, ureotelic (e) Habitata- aquatic 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 catalyze reactions. 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 CO ₂ + H ₂ O (Glycolysis and Krebs cycle) - synthesis of glucose from CO ₂ and H ₂ O (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: | <p style="text-align: center;">ATTESTED</p> <p style="text-align: center;">Dr. S. RAMABALAN M.E. Ph.D. PRINCIPAL E.G.S. Pillay Engineering College Thethi, Nagore - 611 002. Nagapattinam (Dt) Tamil Nadu</p> <ol style="list-style-type: none"> 1. Biology for Engineers, Rajiv Singal .CBS Publishers and Distributors Pvt Ltd; First Edition edition (4 June 2019). 2. Biology for Engineers, Editorial, Wiley (2018). 3. Principles of Soft Computing, S. N. Sivanandan, 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 Stagers, 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 |

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| 1902MCX02 | CONSTITUTION OF INDIA | L | T | P | C |
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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 own ancient 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

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TOTAL: 30 HOURS

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| 1904GE351 | LIFE SKILLS: VERBAL ABILITY | L | T | P | C |
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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.

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| | 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: <i>skill development</i> | | |
| 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 | |
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| 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 | | | | | 9 Hours | |
| | | 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 | Introduction to database - Data Base Architecture - Data Independence - Functional Dependencies -- Relational Algebra-Entity relationship model - mapping cardinalities-keys, E-R diagrams. | | | | | 9 Hours | |
| UNIT II | QUERY LANGUAGE & OPTIMIZATION | 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 | | | | | 9 Hours | |
| UNIT III | TRANSACTION PROCESSING | Transaction Processing - Properties of Transactions -Serializability - Concurrency Control-Locking Mechanisms - Time Stamp ordering -Two phase Commit Protocol-Deadlock-Recovery systems-Log-based recovery. | | | | | 9 Hours | |
| UNIT IV | FILES AND INDEXING | Overview of Physical Storage Media-RAID -File Organization-File operations - Hashing Techniques - Indexing -Single level and Multi-level Indexes-B+ tree Index Files-B tree Index Files. | | | | | 9 Hours | |
| UNIT V | ADVANCED TOPICS | 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. | | | | | 45 HOURS | |
| | | 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 ManagementI, fifth edition, Pearson Education, 2011 | | | | | | | | |
| 4.C.J.Date, A.Kannan and S.Swamynathan, —An Introduction to Database SystemsI, Eighth Edition, Pearson Education, 2012. | | | | | | | | |
| 5.Raghu Ramakrishnan, —Database Management SystemsI, Fourth Edition, McGraw-Hill College Publications, 2015. | | | | | | | | |
| 6.Frank. P. Coyle, "XML, Web Services And The Data Revolution" Dr. S. Ramabalan, M.E., Ph.D., 2012 | | | | | | | | |

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

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LIST OF EXPERIMENTS: *Skill Development, Employability*

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| 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.

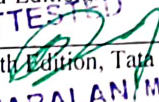
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FURTHER READING / SEMINAR :
 Under MoU with Oracle Academy, a programme Oracle Workforce Development Programme (OWDP) is conducted. In this programme extensive hands-on training on SQL and PL/SQL will be given to students during the Lab sessions. *Nagapat*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

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| 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 |

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| 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 | | No. of students | 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 | | | | | | | | |
| 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 | | | | | | | | |
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| 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 *Employability*
- CO2: Understand different types of requirements and requirement Engineering process *Employability*
- CO3: Understand the systematic procedure for software design and deployment *Employability*
- CO4: Compare and contrast the various testing and maintenance *Entrepreneurship*
- CO5: Understand the concept of change management during development. *Entrepreneurship*
- CO6: Explain the basic concepts of AOP


REFERENCES:

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

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| COURSE OBJECTIVES: | | |
| <ol style="list-style-type: none"> Identify the components required to build different types of networks To learn about the division of network functionalities into layers. Identify solution for each functionality at each layer Choose the required functionality at each layer for given application | | 12 Hours |
| 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 |
| <ol style="list-style-type: none"> Write a network application program Use tools to visualize packet flow Configure Router/Switch to set up network (network administration) Simple Chat Program using TCP Sockets Simulation of HTTP Protocol using TCP Sockets Simulation of Sliding Window Protocol using TCP Sockets Simulation of DNS using UDP Sockets Simulation of Ping using Raw Sockets Learn to use commands like TCP Dump, Netstat, Trace Route Simulate networks using network simulators like NS-2 Performance comparison of MAC protocols using simulation tool 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 | | } Employability Entrepreneurship |
| CO2: Explain the operations of network and transport layers | | |
| 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 | | |
| REFERENCES: | | |
| 1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A systems approach, Fifth Edition, Morgan Kaufmann Publishers, 2016. | | |
| 2. Forouzan, Behrouz A., and Firouz Mosharrar. 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 Internet, 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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|-----------|-----------------------------|---|---|---|---|
| 190211406 | 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.

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|--------|--------------------------------------|---------|
| 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, Angle modulation FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

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| UNIT II | DIGITAL COMMUNICATION | 9 Hours |
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Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying - binary phase shift keying, QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery - squaring loop, Costas loop, DPSK.

| | | |
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| UNIT III | DIGITAL TRANSMISSION | 9 Hours |
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Introduction, Pulse modulation, PCM sampling, sampling rate, signal to quantization noise rate, companding analog and digital percentage error, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission - Intersymbol interference, eye patterns.

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| UNIT IV | SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES | 9 Hours |
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Introduction, Pseudonoise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques - wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications

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| UNIT V | SATELLITE AND OPTICAL COMMUNICATION | 9 Hours |
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Satellite Communication Systems-
Keplers Law, LEO and GEO Orbits, footprint, Link model
Optical Communication 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", Pearson Education, 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, Oxford University 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.

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| 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, 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

ASSESSMENT PATTERN:

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

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| 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

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| | TOTAL: | 30 HOURS |
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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.

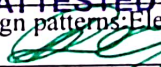
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| 1902IT501 | OBJECT ORIENTED ANALYSIS AND DESIGN | L | T | P | C |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------|---|---|-----------------|
| | | 3 | 0 | 0 | 3 |
| AIM: To study various object oriented analysis and design method using CASE tools | | | | | |
| PREREQUISITE: 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 | 9 Hours | | | |
| Introduction to OOAD – Unified Process - UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams | | | | | |
| UNIT II | DESIGN PATTERNS | 9 Hours | | | |
| 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: Software Development, Software Design | | | | | |
| COURSE OUTCOMES | | | | | |
| At the end of this course, students will able to, | | | | | |
| CO1: Design and implement projects using OO concepts <i>Entrepreneurship</i> | | | | | |
| CO2: Use the UML analysis and design diagrams <i>Entrepreneurship</i> | | | | | |
| CO3: Apply appropriate design patterns <i>Employability</i> | | | | | |
| CO4: Create code from design <i>Employability</i> | | | | | |
| 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, and 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", Third Edition, Addison Wesley, 2013. | | | | | |
| 5. Paul C. Jorgensen, "Software Testing:- A Craftsman's Approach", Third Edition, Artech Publications, Taylor and Francis Group, 2010. | | | | | |
| 6. http://nptel.ac.in/ | | | | | |

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| 1902IT502 | WEB PROGRAMMING | L | T | P | C |
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| AIM: The main objective of this course is used to introduce the concepts of Web Essentials and various web services | | | | | |
| PREREQUISITE: Programming in Java Programming, Database Management Systems. | | | | | |

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| 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 | 12 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 | 12 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 | 12 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 | | |
| TOTAL: | | 45 Hours |

FURTHER READING: Software Development, Mobile Application Development

COURSE OUTCOMES

At the end of this course, students will 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
- CO4: Apply database concept to create interactive web pages *Employability*
- 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, Pearson 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>

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| 1902IT551 | WEB PROGRAMMING LAB | L | T | P | C |
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PREREQUISITE: Programming in Java Programming, Database Management Systems.

LIST OF EXPERIMENTS *Skill Development, Employability, Entrepreneurship*

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

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| 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. |
| Requirements: Web Browser, JDK1.5, Netbeans IDE or Eclipse or Equivalent |
| TOTAL: 30 Hours |

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| 1902117503 | SECURITY IN COMPUTING | L | T | P | C |
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AIM: To study various cryptography techniques for enable security and study various network security protocols

PREREQUISITES: 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

TOTAL: 45 Hours

FURTHER READING Cyber Forensics, Security Management issues

COURSE OUTCOMES *Employability*

After learning the course the student should 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-realtime 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. *Entrepreneurship*

REFERENCES:

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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 with coding theory", Pearson Education, 2012.
7. Thomas Calabrese, "Information Security Intelligence : Cryptographic Principles and Applications", Thomson Delmar Learning, 2012.
8. <http://nptel.ac.in/>

| 1902IT504 | | INTERNET OF THINGS | | | | |
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| AIM: The main objective of this course is to understand the IoT is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. | | | | | | |
| PREREQUISITE | | Basic Programming Knowledge, Computer Architecture | | | | |
| COURSE OBJECTIVES: | | | | | | |
| <ol style="list-style-type: none"> 1. Study the concept of Microprocessor and Microcontrollers 2. Study what is Internet of Thing and learning concepts 3. Get basic knowledge of RFID technology, sensor technology and satellite technology 4. Students aware of resource management and security issues in Internet of Things 5. Study the concept of Internet of Things in the real world scenario | | | | | 12 Hours | |
| UNIT I | INTRODUCTION TO IOT | | | | | |
| What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks: IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities | | | | | | |
| UNIT II | IOT PROTOCOLS | | | | | |
| Sensors - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards | | | | | | |
| UNIT III | CASE STUDY | | | | | |
| IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture - Software & Management Tools for IoT | | | | | | |
| UNIT IV | BUILDING IOT WITH RASPBERRY PI AND GALILEO/ARDUINO | | | | | |
| Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services - Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks – path planning – obstacle avoidance technique | | | | | | |
| UNIT V | EXPERIMENTS USING IOT | | | | | |
| Home Automation – Cities – Environment – Energy – Retail – Logistics - Agriculture - Industry - Health and Lifestyle - IoT and M2M | | | | | | |
| REQUIREMENTS: Raspberry Pi and Arduino Tool Kit | | | | | TOTAL: | 60 Hours |
| COURSE OUTCOMES | | Employability | | | | |
| At the end of this course, students will able to, | | | | | | |
| CO1: Apply microprocessor and microcontrollers concepts to solve various IoT problems | | | | | | |
| CO2: Explain the concepts of IoT and protocols | | | | | | |
| CO3: Illustrate various case studies and protocol architecture | | | | | | |
| CO4: Develop a portable IOT using Arduino or equivalent boards and relevant protocols. | | | | | | |
| CO5: Analyze applications of IOT in real time scenario. | | | | | | |
| REFERENCES: | | | | | | |
| 1. Romesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram International Publishing (India) LTD, 2017 | | | | | | |
| 2. Yu-Cheng Liu, Glenn A. Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2014. | | | | | | |
| 3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education, 2013. | | | | | | |
| 4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolution of Embedded Communications", ISBN: 978-1-118-47347-4, Willy Publications, 2017 | | | | | | |

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| 5. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer.,2016 |
| 6. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015 |
| 7. http://nptel.ac.in/ & http://coursera.org/ |

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| 1904IT551 | CASE TOOLS (MINI PROJECT I) | L | T | P | C |
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AIM: The objective of this course is student develop mini project using CASE tools

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

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

Suggested domains for Mini-Project (not Limited too):

- Passport automation system
- Book bank
- Online Examination
- Online course reservation system
- E-ticketing
- E-Commerce
- Recruitment system
- Foreign trading system
- Conference Management System
- BPO Management System
- Library Management System

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

TOTAL: 45 Hours

COURSE OUTCOMES

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

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

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| 1904IT552 | STARTUP OPPORTUNITIES FOR IT ENGINEERS | L | T | P | C |
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AIM: This course helps you understand the process of entrepreneurship from a technology-oriented background

COURSE OBJECTIVES:

1. Learn what it takes to become a "technopreneur"
2. Explore various methods for identifying opportunities
3. Learn how to conduct market research and provide evidence for the viability of the business idea
4. Develop a viable business proposition and learn to pitch your ideas for various audiences
5. Understand the dynamics of new venture development and team building
6. Develop the ability to translate a business idea into marketing and financial plans

Course Contents

1. Introduction to Startups

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| 2. | Innovation & Entrepreneurship | | |
| 3. | Entrepreneurial Mindset, Entrepreneurial Skillset | | |
| 4. | Global Startup Eco System | | |
| 5. | IT based Startup Trends | | |
| 6. | Problems – Identification, Selection & Validation | | |
| 7. | Evolution of Technology & Startups | | |
| 8. | Startup Opportunity Identification | | |
| 9. | Business Model Trends – Examples | | |
| 10. | Startup Idea & Technology Landscape | | |
| 11. | Digital Marketing | | |
| 12. | Minimum Viable Product Development & Tools for Creating MVPs | | |
| 13. | Patentability | | |
| 14. | Raising Capital & Funding Models | | |
| 15. | Legal Procedures & Launchpad | | |
| | | TOTAL: | 30 HOURS |
| COURSE OUTCOMES: | | Entrepreneurship | |
| After completion of the course, Student will be able to | | | |
| CO1 | Explain Concepts of Innovation, Entrepreneurship and Startups in Technology | | |
| CO2 | Develop Startup or Business ideas, minimum viable products and business models for real life problems | | |
| Evaluation Procedure | | | |
| 1. | Assignment 1– Review of IT based Startups – 20 Marks | | |
| 2. | Assignment 2– Problems, Problem Identification, Selection & Evaluation – 30 Marks | | |
| 3. | Assignment 3 – Review of Business Models of IT based Startups – 20 Marks | | |
| 4. | Presentation – Idea, Market Research Results, 1st MVP, Possible Fund Raising Model to be adopted. IP – 30 Marks | | |
| REFERENCES: | | | |
| 1. The High-Performance Entrepreneur by Subroto Bagchi | | ATTESTED  Dr. S. RAMABALAN, M.E., Ph.D. PRINCIPAL E.G.S. Pillay Engineering College, About Rajahmundry, 511 002, Nagapattinam (Dt) Tamil Nadu. | |
| 2. The Law of Success in Sixteen Lessons Paperback by Napoleon Hill | | | |
| 3. The E-Myth Revisited: Why Most Small Businesses Don't Work and What to Do About It by Michael E. Gerber | | | |
| 4. https://www.edx.org/course/entrepreneurship-for-engineers | | | |

| 1904GE551 | LIFE SKILLS: APTITUDE – I | L | T | P | C |
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| Course Objectives: | | | | | |
| The students should be made to: | | | | | |
| 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- | | | | | |

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| 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 |
| COURSE OUTCOMES: <i>skill development</i> | | |
| 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', 7 th edition, McGraw Hills publication, 2016. | | |
| 2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4 th 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", 3 rd edition, Arihant publication, 2018. | | |
| 6. B.S. Sijwalii and Indu Sijwali, "A New Approach to REASONING", 2 nd edition, Arihant publication, 2014. | | |
| ASSESSMENT PATTERN : | | |
| 1. Two tests will be conducted (25 * 2) - 50 marks | | |
| 2. Five assignments will be conducted (5*10) - 50 Marks. | | |

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N: *[Signature]* **Chennai (DT) Tamil Nadu.**

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---|---|---|-----------------|
| 1902MCX03 | ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE | L | T | P | C |
| | | 2 | 0 | 0 | 0 |
| COURSE OBJECTIES: | | | | | |
| 1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. | | | | | |
| 2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. | | | | | |
| 3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system. | | | | | |
| 1. Basic Structure of Indian Knowledge System (i) Vedas, (ii) Uveda (Ayurveda, Dhanurveda, Gandhaveda, Sthaitya Adad) (iii) Vedang (Shiksha, Kalla, Nanrut, Grammar, Jyotisha Chhanda), (iv) Uraiga (Dharma Vastra, Shringa, Guarana, Tirmasra) | | | | | |
| 2. Modern Science and Indian Knowledge System | | | | | |
| 3. Yoga and Holistic Health care | | | | | |
| 4. Case Studies. | | | | | |
| TOTAL: | | | | | 30 HOURS |
| COURSE OUTCOMES: <i>Employability</i> | | | | | |
| After completion of the course, Student will be able to understand, connect up and explain basics of Indian Traditional knowledgemodern scientific perspective | | | | | |
| REFERENCES: | | | | | |

| 1901MGX01 | TOTAL QUALITY MANAGEMENT | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---|---|-----------------|
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| 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 IT 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 \bar{X} 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 able to, | | | | |
| CO1: Understand the concepts, dimension quality and philosophies of TQM. <i>skill development</i> CO2: Understand the principles of TQM and its strategies. CO3: Apply seven statistical quality and management tools <i>Employability</i> CO4: Understand TQM tools for continuous improvement. CO5: Understand the Quality Management system <i>Entrepreneurship</i> | | | | |
| 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 2005 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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| 1902IT601 | ARTIFICIAL INTELLIGENCE | L | T | P | C |
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| | | 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: | | | | | |
| <ol style="list-style-type: none"> 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 Satisfaction 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 <i>Employability</i> | | | | | |
| At the end of this course, students will able to, | | | | | |
| <ul style="list-style-type: none"> 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: | | | | | |
| <ol style="list-style-type: none"> 1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill Education, 2016. 2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2012. 3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2014. 4. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education, 2011. 5. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013. 6. http://nptel.ac.in/ | | | | | |

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| 1902IT602 | MOBILE COMPUTING | L | T | P | C |
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| | | 3 | 0 | 0 | 3 |
| AIM: This course is study various mobile communication protocols, telecommunications and MANETs | | | | | |
| PREREQUISITE: Computer Networks | | | | | |
| COURSE OBJECTIVES: | | | | | |
| <ol style="list-style-type: none"> 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. | | | | | |

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| 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: On site seminar at Telecommunication networks

COURSE OUTCOMES *Employability*

At the end of this course, students will 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 Agarwal, Qing and An Zeng, "Introduction to Wireless and Mobile Systems", Thomson Asia Pvt Ltd, 2013.
4. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Storer, "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.Toth, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2000.
7. <http://nptel.ac.in/>

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|-----------|-----------------------------------------|---|---|---|---|
| 1902IT603 | DATA WAREHOUSING AND DATA MINING | L | T | P | C |
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AIM: The main objective of this course is used to the safe storage of data, data warehouse and data mining techniques.

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

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| UNIT I | INTRODUCTION TO DATA WAREHOUSING | 9 Hours |
| Data warehouse and OLAP technology – Types of Database – Multidimensional data model – Data warehouse architecture – Data warehouse schema – Implementation | | |
| UNIT II | DATA MINING PRIMITIVES AND CONCEPT DESCRIPTION | 9 Hours |
| Introduction to Data mining – Preprocessing – Predictive Analysis - Data mining primitives – Data mining query language - concept description – Data generalization and characterization – Analytical characterization – Mining Descriptive statistical measures in large databases | | |
| UNIT III | CLASSIFICATION AND PREDICTION | 9 Hours |
| Introduction – Decision Tree Induction – Bayesian Classification – Back propagation – Lazy Learners – Other classification methods – Prediction – Evaluating the accuracy | | |
| UNIT IV | CLUSTERING AND ASSOCIATION | 9 Hours |
| Similarity and Distance Measures – Hierarchical Algorithms – Partition Algorithms – Outlier Analysis – Mining Frequent Patterns, Associations, and Correlations | | |
| UNIT V | ADVANCED TOPICS | 9 Hours |
| Web Mining – Web Content Mining – Structure and Usage Mining – Spatial Mining – Time Series and Sequence Mining – Graph Mining. | | |

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| FURTHER READING: Data Science, Data Classifications | | TOTAL: 45 Hours |
| 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. <i>Employability</i> | | |
| CO3: Discuss on appropriate Classification/ Clustering techniques for various problems with high dimensional data. | | |
| CO4: Apply data mining techniques and methods to large data sets. <i>Entrepreneurship</i> | | |
| CO5: Illustrate various data mining techniques on complex data objects and advanced concepts | | |
| REFERENCES: | | |
| 1. Jiawei. Han, Micheline Kamber, "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, Prudice-Hall, New Delhi, 2013. | | |
| 4. http://nptel.ac.in/ | | |

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|-----------|-------------------------------------------------------------|---|---|---|---|
| 1904IT651 | MOBILE APPLICATION DEVELOPMENT (MINI PROJECT II) | L | T | P | C |
| | | 0 | 0 | 2 | 1 |

AIM: This course is used to students will understand and develop mobile apps as a team/individual and useful of society

PREREQUISITE: Java Programming, 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 Multimodal 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

SOFTWARE REQUIREMENTS: Android Studio or Eclipse or Equivalent

TOTAL: 45 Hours

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| COURSE OUTCOMES |
| 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 <i>Skill Development</i> CO5: Design and develop mobile applications using one application development framework <i>Entrepreneurship</i> CO6: Covert developed application to mobile <i>Employability</i> |

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| 1904GE65I | LIFE SKILLS: APTITUDE – II AND GROUP DISCUSSION | L T P C |
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Course Objectives:
The students should be made to:

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 Analytical 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

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| Unit I | PARTNERSHIP, MIXTURES AND ALLEGATIONS, PROBLEM ON AGES, SIMPLE INTEREST, COMPOUND INTEREST | 6 Hours |
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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.

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| Unit II | BLOOD RELATIONS, CLOCKS, CALENDARS | 6 Hours |
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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

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| Unit III | TIME AND DISTANCE, TIME AND WORK | 6 Hours |
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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

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| Unit IV | DATA INTERPRETATION AND DATA SUFFICIENCY | 6 Hours |
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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

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| Unit V | ANALYTICAL AND CRITICAL REASONING | 6 Hours |
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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 .

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| GROUP DISCUSSION | TOTAL | 30 Hours |
|-------------------------|--------------|-----------------|

COURSE OUTCOMES: *Skill Development*

At the end of the course, the student should 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:

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. Sijwali and Indu Sijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihant publication, 2014


ASSESSMENT PATTERN :

- Two tests will be conducted (25 * 2) - 50 marks
- Two assignments will be conducted (2*10) - 20 Marks.
- Group Discussion - 30 marks

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| 1904IT652 | INDUSTRIAL VISIT PRESENTATION | L | T | P | C |
| | <i>Skill Development, Employability Enhancement</i> | 0 | 0 | 2 | 1 |
| <p>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.</p> | | | | | |
| ATTESTED | | | | | |
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| Internal Assessment Only | |
|-------------------------------------------------------------|----|
| Test | 40 |
| Presentation / Quiz / Group Discussion | 40 |
| Report | 20 |
| Grades (Excellent / Good / Satisfactory / Not Satisfactory) | |

PROFESSIONAL CORE ELECTIVE II

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| 1903IT005 | 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: | | | | | |
| <ol style="list-style-type: none"> Understand the recent trends in the field of computer architecture and identify performance related parameters Appreciate the need for parallel processing Understand the challenges in parallel and multi-threaded programming 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 | | | | | |
| 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.

Employability

- 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, 2011.
 3. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kaufmann/Elsevier, 2011.
 4. John L. Hennessy 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 quantitative approach", Morgan Kaufmann Elsevier Publishers, 2012.
 6. <http://nptel.ac.in/>

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| 1903IT006 | CYBER SECURITY | 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

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| 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 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, Stuart, "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. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3 rd Edition, Prentice Hall, 2013.
 6. <http://nptel.ac.in/>

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| 19EHS003 | STARTUP ENTREPRENEURSHIP | L | T | P | E |
| | | 3 | 0 | 0 | 3 |
| PREREQUISITE: | | | | | |
| The course assumes no prior skill or background in design, art, engineering, or science. It is open to all undergraduates and graduate students with an interest in learning Entrepreneurship, and is especially recommended for those students planning venture creation and other kinds of entrepreneurial interventions. | | | | | |
| COURSE OBJECTIVES: | | | | | |
| 1. Understand the terminology and conceptual of Entrepreneurship & Startups | | | | | |
| 2. Understand real time problem solving methodologies with tools | | | | | |

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| | 3. Recognize the ethical and social dilemmas and obligations of the practice of design of solutions | |
| | 4. Diagnose common adoption barriers in individuals, groups and organizations. | |
| | 5. Develop a design theory from independent and qualitative research and observations | |
| | 6. Participate in and lead innovation in creative and collaborative settings | |
| | 7. Undertake complex and unstructured problem-solving challenges in unfamiliar domains | |
| Module I | Entrepreneurship & Startup Basics | 5 Hours |
| Entrepreneurship basics – Skill Set, Mindset, Examples, Startup basics overview, Indian Startup ecosystem, Problems – Identification, Selection, Evaluation, Validation, Teaming | | |
| Module II | Customer Discovery Process | 7 Hours |
| Customer Discovery Process, Opportunity Identification, Evaluating Opportunities, Customer discovery through at least 15 interviews. Results presentation and hypothesis refinement. Focus on customer segments of the business model canvas. | | |
| Module III | Ideation | 5 Hours |
| Ideation – Brainstorming, Technology driven Ideation, Continued customer discovery and updates to hypothesis. Focus on value proposition of business model canvas. | | |
| Module IV | Market Analysis | 6 Hours |
| Market Analysis – Perform market research, Competitive advantage landscape, Market Size, Go-To Market Strategies, Continued customer discovery and updates to hypothesis. Focus on channels of business model canvas. | | |
| Mid-term presentation on startup idea, refined hypothesis through customer discovery | | |
| Module V | Minimum Viable Product | 5 Hours |
| Minimum Viable Product/Validation: Product market fit, use customer discovery in defining the MVP, Build Proof Of Concepts for specific customer use-cases. Focus on metrics of business model canvas. | | |
| Module VI | Business Models | 7 Hours |
| Business Models/Metrics – Chosen business model for the venture, Focus on key resources/activities of business model canvas. Start customer validation phase. | | |
| Module VII | Pivoting | 3 Hours |
| Pivoting - Pivot product and business models based on customer discovery and validation, Choose pivot point. Focus on cost structures and partners of business model canvas. Continued customer validation. | | |
| Mid-term presentation on startup prototype, preliminary results from customer validation, prototype refinements and plan. | | |
| Module VIII | IP/Legal | 4 Hours |
| IP/Legal: Importance of IP, Protect IP, Licensing IP, IP based Entrepreneurship; Examples, Continued customer validation. | | |
| Module IX | Capital | 3 Hours |
| Capital: Capital requirement for the venture, Raising capital & increments, Continued customer validation. Liquidity/Exit: Liquidity events, Trade-offs | | |
| Final presentations of startup idea, refined prototype, customer validation, and future plans | | |
| TOTAL: 45 HOURS | | |
| Course Outcomes: Entrepreneurship | | |
| 1. Detail Entrepreneurship and Startup Basics | | |
| 2. Employ the methods and tools of Problem Solving in business context | | |
| 3. Project Startup Idea Development Process and Methodologies through Real Problem Solving | | |
| 4. Develop Startup Prototype through Customer Validation and Business Models | | |
| 5. Explain Intellectual Property Rights and its importance in business context | | |
| ADDITIONAL READING: | | |
| 1. The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company by Steve Blank | | |
| 2. Value Proposition Design: How to Create Products and Services Customers Want (Strategyzer) by Alexander Osterwalder | | |
| 3. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers by Alexander Osterwalder | | |
| 4. The Four Steps to the Epiphany, Steven Blank | | |
| ATTESTED  Dr. S. RAMABALAN, M.E., Ph.D. PRINCIPAL | | |
| REFERENCES: | | |
| 1. Creative Confidence: Unleashing the Creative Potential Within Us All by David Kelley and | | |

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan, Fritzof Capra, Tao of Physics
3. Fritzof Capra, The wave of Life
4. V N Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad,Amaku,am
5. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
6. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyadip Prakasham, Delhi,2016
7. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyadip Prakasham, Delhi, 2016
8. P R Sharma (English translation), Shodashang Hridayam

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PROFESSIONAL ELECTIVE I

| 1903IT001 | SOFTWARE TESTING METHODS AND TOOLS | L | T | P | C |
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| 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: | | | | | |
| <ol style="list-style-type: none"> 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, | | | | | |
| <ol style="list-style-type: none"> CO1: Explain the software by applying testing techniques to deliver a product free from bugs CO2: Evaluate the web applications using bug tracking tools. CO3: Investigate the scenario and the able to select the proper testing technique CO4: Explore the test automation concepts and tools | | | | | |

Employability

B.TECH. Information Technology | E.G.S. Pillay Engineering College (Autonomous) Regulations 2019 |
Approved in VI Academic Council Meeting held on 06.03.2021

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 Gopaldaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2014.
3. Naresh Chauhan. "Software Testing Principles and Practices" Oxford University Press, New Delhi, 2017.
4. Stephen Kan. "Metrics and Models in Software Quality", Addison – Wesley, Second Edition, 2012.
5. Llene Burnstein. " Practical Software Testing", Springer International Edition, Chennai, 2011.
6. Renu Rajani, Pradeep Oak. "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2010
7. <http://nptel.ac.in/>

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VIRTUAL REALITY

L T P C

1701MGX01

PROFESSIONAL ETHICS

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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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- David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)
- 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:

- Deploying the Data Analytics lifecycle to address big data analytics projects.
- Reframing a business challenge as an analytics challenge
- Applying appropriate analytic techniques and tools to analyze big data.
- Selecting appropriate data visualizations to clearly communicate analytic insights to business sponsors and analytic audiences.
- 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

employability

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

Entrepreneurship

CO5: Use various Streaming tools in Big Data Analytics problems

Entrepreneurship

REFERENCES:

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

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SECURITY IN COMPUTING

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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.

9 Hours

UNIT I INTRODUCTION

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.

9 Hours

UNIT II PUBLIC KEY CRYPTOGRAPHY

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.

9 Hours

UNIT III AUTHENTICATION AND HASH FUNCTION

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.

9 Hours

UNIT IV NETWORK SECURITY AND FIREWALLS

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.

9 Hours

UNIT V HACKING

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

15 Hours

LIST OF EXPERIMENTS:

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 with coding theory", Pearson Education, 2012.
7. Thomas Calabrese, "Information Security-Intelligence, Cryptographic Principles and Applications", Thomson Delmar Learning, 2012.
8. <http://nptel.ac.in/>

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| 170311703 | CLOUD INFRASTRUCTURE AND COMPUTING | L | T | P | C |
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PREREQUISITE:

1. Distributed Computing
2. Data Mining and Data Warehousing

COURSE OBJECTIVES:

1. Introduce the broad perceptives 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.

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

I. 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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1704IT751

SOFTWARE DEVELOPMENT
(MINI PROJECT III)

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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**

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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:

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

Skill Development

- 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 |
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| | | 3 | 0 | 0 | 3 |
| PREREQUISITE: Distributed Computing, Cloud Computing | | | | | |
| COURSE OBJECTIVES: | | | | | |
| <ol style="list-style-type: none"> To expose students with the basics of managing the information To explore the various aspects of database design and modeling. To examine the basic issues in information governance and information integration 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 | <i>Employability</i> | | | | |
| 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: | | | | | |
| <ol style="list-style-type: none"> Alex Berson, Larry Dubov Master Data Management and Data Governance, 2/E, Tata McGraw Hill, 2015 Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2013 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 |
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| | | 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. <i>Skill Development</i> | | | | | |
| CO3: Apply seven statistical quality and management tools <i>Employability</i> | | | | | |
| CO4: Understand TQM tools for continuous improvement. | | | | | |
| CO5: Understand the Quality Management system <i>Entrepreneurship</i> | | | | | |
| 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. Lindsay, 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

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0 0 18 9

Course Objectives:

The student should be made to:

- Skill Development, Employability, Entrepreneurship*
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: | | | | | | | |
| <ol style="list-style-type: none"> 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: <i>Employability</i> | | | | | | | |
| At the end of this course, students will be able to, | | | | | | | |
| <div style="border: 1px solid black; padding: 5px;"> 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 </div> | | | | | | | |
| REFERENCES: | | | | | | | |
| <ol style="list-style-type: none"> 1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2014. 2. Nelson, Phillips, Einfinger, Steuart, "Computer Forensics and Investigation", Cengage Learning, India Edition, 2012 3. John R. Vacca, "Computer Forensics", Cengage Learning, 2013 4. Richard E. Smith, "Internet Cryptography", 3rd Edition Pearson Education, New York, 2012. 5. Marjie T. Britz, "Computer Forensics and Cyber Crime": An Introduction, 3rd Edition, Prentice Hall, 2013. | | | | | | | |

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DI. S. SRINIBAS PRINCH

E.G.S. Pillay Engineering College

Thiruvananthapuram

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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: | | | | | | | | |
| <ol style="list-style-type: none"> 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. | | | | | | | | |

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| 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 development - Staff training and certification corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval. | | |
| UNIT IV | SOFTWARE QUALITY MANAGEMENT & METRICS | 9 Hours |
| Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process & Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model. | | |
| UNIT V | STANDARDS, CERTIFICATIONS & ASSESSMENTS | 9 Hours |
| Quality management standards – ISO 9001 and ISO 9000-3 – CMM and CMMI assessment methodologies - Prototyping methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization Quality Assurance – Department management responsibilities – Project management responsibilities – SQA tools and other actors in SQA systems | | |

TOTAL: 45 Hours

COURSE OUTCOMES: *Employability*

At the 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.

REFERENCES:

1. Daniel Galin, "Software Quality Assurance", Pearson Publications, 2002.
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 Thomson Computer Press, 2012.
4. <http://nptel.ac.in>

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| 1703IT027 | DEEP LEARNING <i>New</i> | 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 I. Mackay (Author) Learning to Think: Supervised

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