

SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.Tech-Information Technology

CURRICULUM and SYLLABI

[For students admitted in 2018-2019]

B.E / B.Tech Regulation 2015R

Approved by BOS and Academic Council meetings

SONA COLLEGE OF TECHNOLOGY, SALEM – 636 005
(An Autonomous Institution)

Courses of Study for BE/BTech Semester I under Regulations 2015R (CBCS)

Branch: IT

| S.No. | Course Code | Course Title | L | T | P | C | Group code | |
|------------------------------------|-------------|---|---|---|---|---|------------|--|
| Theory | | | | | | | | |
| 1 | U15ENG101AR | Technical English – I | 2 | 0 | 2 | 3 | HS | |
| 2 | U15MAT102AR | Mathematics – I | 3 | 2 | 0 | 4 | BS | |
| 3 | U15PHY103AR | Engineering Physics | 3 | 0 | 0 | 3 | BS | |
| 4 | U15CHE104BR | Applied Chemistry | 3 | 0 | 0 | 3 | BS | |
| 5 | U15CPR105AR | Programming in C | 3 | 0 | 0 | 3 | ES | |
| 6 | U15BEE106R | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | ES | |
| Practical | | | | | | | | |
| 7 | U15PCL107BR | Physics and Chemistry Laboratory – I ¹ | 0 | 0 | 2 | 1 | BS | |
| 8 | U15CPL108AR | C Programming Laboratory | 0 | 0 | 2 | 1 | BS | |
| 9 | U15EPL109R | Engineering Practices Laboratory ² | 0 | 0 | 2 | 1 | ES | |
| Total Credits | | | | | | | 22 | |
| Optional Language Elective* | | | | | | | | |
| 10 | U15OLE1101 | French | 0 | 0 | 2 | 1 | HS | |
| 11 | U15OLE1102 | German | | | | | | |
| 12 | U15OLE1103 | Japanese | | | | | | |

*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (over and above the CGPA calculation).

¹ Laboratory classes on alternate weeks for Physics and Chemistry. The lab examination will be conducted separately for 50 marks each with 2 hours duration.

² The lab examination will be conducted separately for Group A (Civil & Mechanical) and Group B (Electrical & Electronics) with 50 marks each with 1 ½ hours duration.

Approved by

| | | | |
|---|---|--|---|
| HOD- First Year Dr. M. Renuga | Chairman BOS/IT & HOD-IT Dr. J. Akilandeswari | Member Secretary, Academic Council Dr. R. Shivakumar | Chairperson, Academic Council & Principal Dr. S.R.R. Senthilkumar |
|---|---|--|---|

SONA COLLEGE OF TECHNOLOGY, SALEM – 636 005
(An Autonomous Institution)

Courses of Study for BE / B Tech Semester II under Regulations 2015R (CBCS)
Branch: IT

| S.No. | Course Code | Course Title | L | T | P | C | Group code | |
|------------------------------------|-------------|---|---|---|---|---|------------|--|
| Theory | | | | | | | | |
| 1 | U15ENG201AR | Technical English –II | 2 | 0 | 2 | 3 | HS | |
| 2 | U15MAT202AR | Mathematics – II | 3 | 2 | 0 | 4 | BS | |
| 3 | U15PHY203BR | Physics of Materials # | 3 | 0 | 0 | 3 | BS | |
| 4 | U15CHE204AR | Environmental Science and Engineering [§] | 3 | 0 | 0 | 3 | BS | |
| 5 | U15PDS206R | Programming and Data Structures | 3 | 0 | 0 | 3 | ES | |
| 6 | U15EGR207R | Engineering Graphics ¹ | 2 | 2 | 0 | 3 | ES | |
| Practical | | | | | | | | |
| 7 | U15PCL208BR | Physics and Chemistry Laboratory – II ² | 0 | 0 | 2 | 1 | BS | |
| 8 | U15PDS209R | Programming and Data Structures Laboratory | 0 | 0 | 2 | 1 | ES | |
| 9 | U15BEEL210R | Basic Electrical and Electronics Engineering Laboratory | 0 | 0 | 2 | 1 | ES | |
| Total Credits | | | | | | | 22 | |
| Optional Language Elective* | | | | | | | | |
| 10 | U15OLE1201 | French | 0 | 0 | 2 | 1 | HS | |
| 11 | U15OLE1202 | German | | | | | | |
| 12 | U15OLE1203 | Japanese | | | | | | |

*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (over and above the CGPA calculation).

Common to CSE & IT branches

[§] Common to CSE & IT branches.

¹ The examination will be conducted for 3 hours both through written and practical mode.

² Laboratory classes on alternate weeks for Physics and Chemistry. The lab examination will be conducted separately for 50 marks each with 2 hours duration.

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| | | | |
|--|---|--|---|
| HOD-First Year Dr. M. Renuga | Chairman BOS/IT & HOD-IT Dr. J. Akilandeswari | Member Secretary, Academic Council Dr. R. Shivakumar | Chairperson, Academic Council & Principal Dr. S.R.R. Senthilkumar |
|--|---|--|---|

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|--------------------------------------|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15MAT301ER | Discrete Mathematics | 3 | 2 | 0 | 4 |
| 2 | U15IT301R | Advanced Data Structures | 3 | 0 | 0 | 3 |
| 3 | U15IT302R | Digital Logic Design | 3 | 0 | 0 | 3 |
| 4 | U15IT303R | Principles of Communication | 3 | 0 | 0 | 3 |
| 5 | U15IT304R | Object Oriented Programming in C++ | 3 | 0 | 0 | 3 |
| 6 | U15IT305R | Computer Architecture | 3 | 0 | 0 | 3 |
| Practical | | | | | | |
| 7 | U15IT306R | Data Structures using C++ Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15IT307R | Digital Logic Design Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15ENG301R | Communications Skill Laboratory | 0 | 0 | 2 | 1 |
| 10 | U15GE301R | Soft Skills and Aptitude - I | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 24 |

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Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

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Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/Information Technology, Third Semester BE IT Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester IV under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|---|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15MAT401ER | Probability and Statistics | 3 | 2 | 0 | 4 |
| 2 | U15IT401R | Operating Systems | 3 | 0 | 2 | 4 |
| 3 | U15IT402R | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 4 | U15IT403R | Design and Analysis of Algorithms | 3 | 0 | 2 | 4 |
| 5 | U15IT404R | Software Engineering | 3 | 0 | 0 | 3 |
| 6 | U15IT405R | Java Programming | 3 | 0 | 0 | 3 |
| Practical | | | | | | |
| 7 | U15IT406R | Java Programming Laboratory | 0 | 0 | 2 | 1 |
| 8 | U15IT407R | Microprocessors and Microcontrollers Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15GE401R | Soft Skills and Aptitude - II | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 24 |

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Copy to:-

HOD/Information Technology, Fourth Semester BE IT Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester V under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|--|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15IT501R | Computer Networks | 3 | 0 | 0 | 3 |
| 2 | U15IT502R | Database Management Systems | 3 | 0 | 0 | 3 |
| 3 | U15IT503R | Theory of Computation | 3 | 2 | 0 | 4 |
| 4 | U15IT504R | Web Technology | 3 | 0 | 0 | 3 |
| 5 | U15IT904R | Elective - Computer Graphics | 2 | 0 | 2 | 3 |
| | U15IT905R | Elective - C# .Net | | | | |
| Practical | | | | | | |
| 6 | U15IT505R | Computer Networks Laboratory | 0 | 0 | 2 | 1 |
| 7 | U15IT506R | Database Management Systems Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15IT507R | Web Technology Laboratory | 0 | 0 | 4 | 2 |
| 9 | U15IT508R | Mini Project - I | 0 | 0 | 2 | 1 |
| 10 | U15GE501R | Soft Skills and Aptitude - III | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 23 |

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Copy to:-

HOD/Information Technology, Fifth Semester B.Tech IT Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VI under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------------|--|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15IT601R | Data Mining | 3 | 0 | 0 | 3 |
| 2 | U15IT602R | Principles of Compiler Design | 3 | 0 | 0 | 3 |
| 3 | noc21-cs17 | Professional Elective - Introduction to internet of things (NPTEL) | 3 | 0 | 0 | 3 |
| 4 | U15IT917R | Elective - Cloud Computing | 3 | 0 | 0 | 3 |
| | U15IT918R | Information Security | | | | |
| | U15IT922R | Machine Learning | | | | |
| 5 | U15CE1003R | Open Elective - Energy Efficiency and Green Building | 3 | 0 | 0 | 3 |
| | U15EC1006R | Sensors and Smart Structures Technologies | | | | |
| | U15EE1001R | Electric Mobility | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | |
| | U15EE1007R | Innovation IPR and Entrepreneurship Development | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | |
| U15ME1004R | Industrial Safety | | | | | |
| Practical | | | | | | |
| 6 | U15IT603R | Python Programming Laboratory | 1 | 0 | 4 | 3 |
| 7 | U15IT604R | Software Design and Testing Laboratory | 1 | 0 | 4 | 3 |
| 8 | U15IT605R | Internet of Things Laboratory | 1 | 0 | 2 | 2 |
| 9 | U15IT606R | Mini Project - II | 0 | 0 | 2 | 1 |
| 10 | U15GE601BR | Soft Skills and Aptitude - IV | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 25 |

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HOD/Information Technology, Sixth Semester B.Tech IT Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VII 2015R (CBCS)
Branch: Information Technology

| S.No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|----------------------|-------------|--|---------|----------|-----------|-----------|---------------------|
| Theory | | | | | | | |
| 1 | U15GE701R | Professional Ethics and Human Values | 3 | 0 | 0 | 3 | 45 |
| 2 | U15IT701R | Cryptography and Network Security | 3 | 0 | 2 | 4 | 75 |
| 3 | U15IT702R | Human Computer Interaction | 2 | 0 | 2 | 3 | 60 |
| 4 | U15IT925R | Elective – Intellectual Property Rights | 3 | 0 | 0 | 3 | 45 |
| | U15IT930R | Big data Technologies | | | | | |
| 5 | U15IT936R | Elective – Mobile Computing | 3 | 0 | 0 | 3 | 45 |
| | U15IT938R | Business Intelligence | | | | | |
| Open Elective | | | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 | 45 |
| | U15CE1003R | Energy Efficiency And Green Building | | | | | |
| | U15EE1004R | Energy Conservation And Management | | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | | |
| | U15EE1007R | Innovation, IPR And Entrepreneurship Development | | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | | |
| | U15FT1003R | Garment Manufacturing Technology | | | | | |
| | U15MC1002R | 3D Printing Technology | | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | | |
| | U15ME1004R | Industrial Safety | | | | | |
| | U15ME1005R | Maintenance Engineering | | | | | |
| U15ME1010R | 3D Printing | | | | | | |
| Practical | | | | | | | |
| 7 | U15IT703R | Mobile Applications Development Laboratory | 0 | 0 | 4 | 2 | 60 |
| 8 | U15IT704R | Cloud Computing Laboratory | 0 | 0 | 4 | 2 | 60 |
| 9 | U15IT705R | Comprehension / Term Paper | 0 | 0 | 2 | 1 | 30 |
| Total | | | | | | 24 | |

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16.06.2021

Regulations-2015R

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VIII 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|----------------------|-------------|--------------|---------|----------|-----------|-----------|---------------------|
| Practical | | | | | | | |
| 1 | U15IT801R | Project Work | 0 | 0 | 24 | 12 | 360 |
| Total Credits | | | | | | 12 | |

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HOD/Information Technology, Eighth Semester B.Tech IT Students and Staff, COE

SONA COLLEGE OF TECHNOLOGY, SALEM – 636 005
(An Autonomous Institution)

Courses of Study for BE/BTech Semester I under Regulations 2015R (CBCS)

Branch: IT

| S.No. | Course Code | Course Title | L | T | P | C | Group code | |
|------------------------------------|-------------|---|---|---|---|---|------------|--|
| Theory | | | | | | | | |
| 1 | U15ENG101AR | Technical English – I | 2 | 0 | 2 | 3 | HS | |
| 2 | U15MAT102AR | Mathematics – I | 3 | 2 | 0 | 4 | BS | |
| 3 | U15PHY103AR | Engineering Physics | 3 | 0 | 0 | 3 | BS | |
| 4 | U15CHE104BR | Applied Chemistry | 3 | 0 | 0 | 3 | BS | |
| 5 | U15CPR105AR | Programming in C | 3 | 0 | 0 | 3 | ES | |
| 6 | U15BEE106R | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | ES | |
| Practical | | | | | | | | |
| 7 | U15PCL107BR | Physics and Chemistry Laboratory – I ¹ | 0 | 0 | 2 | 1 | BS | |
| 8 | U15CPL108AR | C Programming Laboratory | 0 | 0 | 2 | 1 | BS | |
| 9 | U15EPL109R | Engineering Practices Laboratory ² | 0 | 0 | 2 | 1 | ES | |
| Total Credits | | | | | | | 22 | |
| Optional Language Elective* | | | | | | | | |
| 10 | U15OLE1101 | French | 0 | 0 | 2 | 1 | HS | |
| 11 | U15OLE1102 | German | | | | | | |
| 12 | U15OLE1103 | Japanese | | | | | | |

*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (over and above the CGPA calculation).

¹ Laboratory classes on alternate weeks for Physics and Chemistry. The lab examination will be conducted separately for 50 marks each with 2 hours duration.

² The lab examination will be conducted separately for Group A (Civil & Mechanical) and Group B (Electrical & Electronics) with 50 marks each with 1 ½ hours duration.

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|---|---|--|---|

UI5ENG101AR - TECHNICAL ENGLISH I

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 2 | 0 | 2 | 3 | 100 |

Course Outcomes

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

1. frame sentences correctly, both in written and spoken forms of language with accuracy and fluency.
2. develop and demonstrate listening skills for academic and professional purposes.
3. draw conclusions on explicit and implicit oral information.
4. develop effective reading skills and reinforce language skills required for using grammar and building vocabulary.
5. read for gathering and understanding information, following directions and giving responses.

UNIT I – FOCUS ON LANGUAGE

- General Vocabulary
- Prefixes and Suffixes
- Active and Passive Voices
- Adjectives, Comparative Adjectives
- Prepositions and Dependent Prepositions
- Collocations
- Tenses
- Modal Verbs and Probability

UNIT II – LISTENING - I

- Listening to conversations, welcome speeches, lectures and description of equipment.
- Listening to different kinds of interviews (face-to-face, radio, TV and telephone interviews).
- Understanding short conversations or monologues.
- Taking down phone messages, orders, notes etc.
- Listening for gist, identifying topic, context or function.

UNIT III – LISTENING – II

- Listening comprehension, entering information in tabular form.
- Intensive listening exercises and completing the steps of a process.
- Listening exercises to categorise data in tables.
- Listening to extended speech for detail and inference.

UNIT IV – READING -I

- Understanding notices, messages, timetables, advertisements, graphs, etc.
- Reading passages for specific information transfer.
- Reading documents for business and general contexts and interpreting graphical representations.
- Error correction, editing mistakes in grammar, vocabulary, spelling, etc.
- Oral reading – poetry and prose excerpts, general and technical articles, and anecdotes.

UNIT V – READING -II

- Reading passage with multiple choice questions, reading for gist and reading for specific information, skimming for comprehending the general idea, meaning and contents of the whole text.
- Short reading passage: gap-filling exercise related to grammar, testing the understanding of prepositions, articles, auxiliary verbs, modal verbs, pronouns, relative pronouns and adverbs.
- Short reading passage with multiple choice questions, gap-filling exercise testing the knowledge of vocabulary, collocations, dependent prepositions, grammatical structures.
- Short reading passages for sentence matching exercises, picking out specific information in a short text.

Total: 45 Hours

Listening test will be conducted for 20 marks internally and evaluated along with Technical English – I in the End Semester Valuation.

Reading test will be conducted for 20 marks internally and evaluated by internal examiners.

TEXTBOOK

1. Technical English – I & II, Dr. M. Renuga, et al. Sonaversity, Sona College of Technology, Salem, Revised edition, 2016.

EXTENSIVE READING

1. The Story of Amazon.com- Sara Gilbert, published by Jaico
2. The Story of Google – Sara Gilbert, published by Jaico

REFERENCE BOOKS

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

U15MAT102AR - MATHEMATICS – I

(Common to Civil, Mech, Mechatronics, EEE, IT and FT Branches)

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 3 | 2 | 0 | 4 | 100 |

Course Outcomes

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

1. find the Eigen values and Eigen vectors of a real matrix and discuss their properties, reduce a real symmetric matrix from quadratic form to canonical form.
2. explain the three dimensional Cartesian coordinates and discuss the problems in straight line, plane and sphere.
3. describe curvature and find the radius of curvature, circle of curvature, evolutes, involutes and envelope of curves.
4. explain functions of several variables and find the Taylor's series expansion, Jacobians, maximum and minimum values of function of several variables.
5. describe the double and triple integrals, discuss the change of order of integration and find the area and volume by multiple integrals.

UNIT I – MATRICES

9+6

Characteristic equation – Eigen values and Eigen vectors of a real matrix – properties – statement of Cayley – Hamilton theorem and its applications – orthogonal transformation of symmetric matrix to diagonal form – quadratic form – reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II – THREE DIMENSIONAL ANALYTICAL GEOMETRY 9+6

Direction cosines and ratios, angle between two lines – equation of plane, angle between two planes – equation of the straight line, coplanar lines, skew lines – equation of a sphere, plane section of a sphere, tangent plane, orthogonal spheres.

UNIT III – DIFFERENTIAL CALCULUS AND ITS APPLICATIONS

9+6

Curvature in Cartesian coordinates, centre and radius of curvature, circle of curvature – evolutes, envelopes, evolute as the envelope of normals.

UNIT IV – FUNCTIONS OF SEVERAL VARIABLES

9+6

Partial derivatives, total differentiation – differentiation of implicit functions – Taylor’s expansion – maxima and minima, constrained maxima and minima by Lagrange’s multiplier method – Jacobians – properties.

UNIT V – MULTIPLE INTEGRALS

9+6

Evaluation of double integrals in Cartesian and polar coordinates – change of order of integration – change of variables from Cartesian to polar coordinates – area as double integral – evaluation of triple integrals in Cartesian coordinates – volume as triple integral in Cartesian coordinates.

Total: 75 Hours

TEXT BOOKS

1. B.S.Grewal, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. T.Veerarajan, “Engineering Mathematics” (I Year), Tata McGraw Hill, 4th Edition, 2011.

REFERENCE BOOKS

1. P.Kandasamy, K.Thilagavathy and K.Gunavathy, “Engineering Mathematics”, (for first year), S. Chand and Co., Ltd., Revised Edition 2011.
2. E.Kreyszig, “Advanced Engineering Mathematics”, International Student Version, Wiley, 10th Edition, 2015.
3. S. Jayabharathi, “Mathematics - I”, Sonaversity, Revised Edition, 2017.
4. N. P. Bali and M. Goyal, “Engineering Mathematics”, University Science Press, New Delhi, 9th Edition, 2011.

U15PHY103AR - ENGINEERING PHYSICS

(Common to B.E. Mech, Mechatronics, Civil, EEE, CSE & B.Tech. IT, FT Branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. design acoustically good buildings and describe the applications of ultrasonic waves in the field of non-destructive testing
2. classify lasers and explain its applications in the field of medicine, engineering and technology.
3. elucidate the principle of optical fibre communication, applications and the devices involved in the transmission and reception of data.
4. illustrate the dual nature of matter and radiation and its applications.
5. analyze crystal structures and the significance of defects in crystals.

UNIT I – ACOUSTICS AND ULTRASONICS

9

Classification of sound, Pitch, Loudness, Intensity level, Phon, Timbre, Reverberation, Reverberation time – Sabine’s formula and its importance (no derivation) – Sound absorbing materials - Absorption Coefficient and its determination – Factors affecting acoustics of buildings and their remedies – Production of ultrasonic waves by magnetostriction and piezoelectric methods – acoustic grating – Acoustic impedance - Non Destructive Testing – Ultrasonic flaw detector – A scan display - Sonogram (block diagram).

UNIT II – LASERS

9

Principle of spontaneous and stimulated emission – Population inversion - Pumping – Einstein’s A and B coefficients derivation – Basic requirements of a laser - Types of lasers – Nd:YAG laser, CO₂ and Semiconductor lasers (homojunction & heterojunction) – Qualitative applications – Lasers in welding, heat treatment and cutting – Medical applications (qualitative) – holography construction and reconstruction.

UNIT III – FIBRE OPTICS AND APPLICATIONS

9

Principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – Types of optical fibres (material, refractive index, mode) – Double Crucible

Technique of fibre drawing – Splicing – Loss in optical fibre – attenuation, dispersion and bending - Fibre optic communication system (Block diagram) – Fibre optic sensors - temperature and displacement sensor - Endoscope.

UNIT IV – QUANTUM PHYSICS

9

Introduction – Compton Effect theory and experimental verification – Matter waves – Schrodinger's time independent and time dependent wave equation - Physical significance of the wave function – Particle in a one dimensional box – Evolution of microscope - Electron microscope – Comparison of optical and electron microscope - Scanning electron microscope.

UNIT V – CRYSTALLOGRAPHY

9

Crystalline Solids – Amorphous solids – Space Lattice - Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number and atomic packing factor for SC, BCC, FCC and HCP Structures – Polymorphism and allotropy – Crystal imperfections: point , line and surface defects – burger vector.

Total: 45 Hours

TEXT BOOKS

1. B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi, 2012.
2. M. Arumugam, 'Engineering Physics' Anuradha Publications, Kumbakonam, 2006.

REFERENCE BOOKS

1. C. Shanthi et al., Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised edition, 2016).
2. R. K. Gaur and S.C. Gupta, Engineering Physics, Dhanpat Rai Publications, New Delhi, 2003.
3. V. Rajendran and A.Marikani, Engineering Physics, Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi, 2004.
4. M.N. Avadhanulu and PG Kshirsagar, A Text book of Engineering Physics, S.Chand and company, Ltd., New Delhi, 2005.

U15CHE104BR - APPLIED CHEMISTRY

(Common to ECE, CSE & IT branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. analyze the types of polymers, polymerization reactions, polymerization techniques and fabrication methods of polymers for engineering applications.
2. discuss the basic principles of electrochemistry and its applications.
3. analyze the types of corrosion and the various control methods for corrosion prevention.
4. describe the construction, working principle and applications of energy storage devices for electronic appliances.
5. outline the principles, advantages and applications of organic electronic materials used in electronic devices.

UNIT I – POLYMERS AND COMPOSITES

9

Nomenclature of Polymers – Functionality – Types of Polymerization – Addition – Condensation and Copolymerization – Classification of Polymers – Free Radical mechanism of Addition Polymerization – Properties of Polymers- glass transition temperature – tacticity – Methods of Polymerization-Bulk-Solution-Emulsion and Suspension – Plastics – Moulding Constituents of Plastic – Moulding of Plastics into Articles-Injection-Compression and Blow Moulding – Thermoplastic and Thermosetting Resins – Engineering Plastics – Nylon 6,6-Polycarbonate and Polyurethane-Preparation-Properties and Applications – Rubbers – Types – Applications – Vulcanization of Rubber – Composites-Constituents of Composites – Types of FRP Composites.

UNIT II – ELECTROCHEMISTRY

9

Conductivity of Electrolytes – Kohlrausch's Law of Independent Migration of Ions and Its Applications – Conductometric Titration (Acid-Base – HCl vs NaOH) – Electrode Potential – Nernst Equation – Derivation and Problems Based on Single Electrode Potential Calculation – Electrochemical Series – Significance – Reference Electrodes - Standard Hydrogen Electrode, Saturated Calomel electrode – Ion selective electrode – glass electrode – determination of pH for unknown solution – Electrochemical Cell

– Emf of an Electrochemical Cell – Redox Reactions - Potentiometric Titrations (Redox – Fe^{2+} Vs Dichromate).

UNIT III – CORROSION AND CORROSION CONTROL

9

Dry or Chemical Corrosion – Pilling-Bedworth Rule – Wet or Electrochemical Corrosion – Mechanism of Electrochemical Corrosion – Galvanic Corrosion – Concentration Cell Corrosion – Waterline Corrosion – Pitting Corrosion – Intergranular Corrosion – Stress Corrosion – Passivity – Factors Influencing Corrosion – Corrosion Control – Cathodic Protection-Sacrificial Anodic Protection Method and Impressed Current Cathodic Protection – Protective Coatings – Metallic Coatings – Methods of Cleaning Articles Before Electrodeposition – Electroplating and Electro Less Plating of Nickel – Organic Coatings – Paints-Constituents and Functions.

UNIT IV – MODERN ENERGY DEVICES FOR ELECTRONIC APPLIANCES

9

Reversible and Irreversible Cells – Batteries-Types of Batteries – Battery Characteristics – Voltage-Current – Capacity –Electricity Storage Density – Power – Discharge Rate – Cycle Life-Energy Efficiency and Shelf Life – Fabrication and Working of Alkaline Battery – Lead-Acid Battery – Ni – Cd – Lithium Ion Batteries and Solar Cells – Fuel Cells – Hydrogen-Oxygen fuel cell – Nano Batteries- Construction-Working-Advantages and Applications.

UNIT V – CHEMISTRY OF ORGANIC ELECTRONIC MATERIALS

9

Organic Semiconducting Materials – Working Principle and Advantages Over Inorganic Semiconducting Materials – P-Type and N-Type Organic Semiconducting Materials – Pentacene Fullerenes – C-60 – Organic Dielectric Material-Definition-Working Principle and Examples – Polystyrene – PMMA – Organic Light Emitting Polymer – Structure-Properties and Applications of Polythiophene– Organic Light Emitting Diodes (Oleds) – Construction – Working Principle and Applications – Organic Solar Cells-Working Principle and Applications Organic Transistors – Construction-Working Principle and Applications in Electronic Industries.

Total: 45 Hours

TEXT BOOK

1. P. C. Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P), New Delhi, 15e, 2006.

REFERENCE BOOKS

1. M. Raja et al., "Applied Chemistry", Sonaversity, Sona College of Technology, Salem, Revised edition 2018.
2. Joint Contributors, "Engineering Chemistry" John Wiley and Sons, 2e, 2014
3. H.K. Chopra, A. Parmer, "Chemistry for Engineers", Narosa Publishing House, New Delhi, 110 002, 2016.
4. Hagen Klauk, "Organic Electronics: Materials, Manufacturing and Applications", Wiley-VCH, 2006.

U15CPR105AR - PROGRAMMING IN C

(Common to BE - CIVIL, CSE, EEE, MECH, Mechatronics, B.Tech - FT, IT)

| L | T | P | C | M |
|---|---|---|---|-----|
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. formulate problems, apply logics to solve problems by practice and outline the basics of computer technology
2. write, compile and find errors in simple c programs
3. apply the concepts such as arrays, decision making and looping statements to solve real-time applications
4. examine the power of functions and pointers to become expert programmers in c
5. solve simple scientific and statistical problems using structures and unions

UNIT I – INTRODUCTION TO PROBLEM SOLVING AND COMPUTERS

8

Problem formulation, Problem Solving methods, Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart. Need for computer languages, Generation and Classification of Computers- Basic Organization of a Computer

UNIT II – C PROGRAMMING BASICS

10

Structure of a C program – Compiling and Debugging a C program - C Character set, Identifiers and Keywords, Data Types, Declarations, Expressions, Statements and Symbolic constants, Operators – Arithmetic Operators – Unary operators – Relational and Logical Operators – Assignment operators – Conditional operators. Managing Input and Output operations, pre-processor directives and storage classes

UNIT III – CONTROL STATEMENTS, ARRAYS AND STRINGS

9

Unconditional statements, conditional statements, branching and looping statements - Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations and solving simple scientific and statistical problems

UNIT IV – FUNCTIONS AND POINTERS

9

Function – Library functions and user-defined functions – Function prototypes and function definitions – Call by value – Call by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems. Pointers and Functions

UNIT V – STRUCTURES AND UNIONS

9

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures. Union - Programs using structures and Unions

Total: 45 Hours

TEXT BOOKS

1. Yashavant P. Kanetkar, “Let Us C”, BPB Publications, 2011.
2. Balagurusamy E, “Programming in ANSI C”, sixth edition, Tata McGraw-Hill, 2012.

REFERENCE BOOKS

1. Deitel and Deitel, “C How to Program”, Pearson Education, New Delhi, 2011.
2. Byron S Gottfried, “Programming with C”, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education, 2006.
4. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

U15BEE106R - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to CSE & IT Branches)

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. analyze the various dc circuits and find the circuit parameters.
2. describe the principles of ac fundamentals.
3. familiarize construction and working principle of dc machines and transformer.
4. explain the basics of semiconductor devices and its applications.
5. discuss the various applications of operational amplifier and working principle of ups.

UNIT I – DC FUNDAMENTALS

9

Electrical Components and parameters – Resistance, Conductance – Ohm’s Law, Limitations of Ohm’s Law- Power – Energy – Resistors in series and parallel – comparison of series and parallel circuits - Star – Delta Transformation – Kirchhoff’s Law – simple problems.

UNIT II – AC FUNDAMENTALS

9

AC Waveforms - Standard Terminologies – RMS and Average value of Sinusoidal, Triangular and Square wave forms - Form Factor, Peak Factor- Resistance, Inductance, Capacitance in AC circuits – Impedance – RL, RC, RLC series circuits – Series resonance – simple problems.

UNIT III – ELECTRICAL MACHINES

9

DC Generator: construction of DC Machine – working principle of DC Generator – EMF equation – Types of DC Generator – DC Motor: Working principle of DC Motor – Types of DC Motor – Transformer: Working principle of Transformer – EMF equation – Transformation ratio.

UNIT IV – SEMICONDUCTOR DEVICES

9

PN Junction Diode – VI Characteristics – Zener Diode – VI Characteristics – BJT – Operations of NPN and PNP Transistors – Characteristics of Transistors in CE, CB and CC configuration.

UNIT V – OPERATIONAL AMPLIFIERS & POWER SUPPLY

9

Ideal characteristics of Op-Amp – Inverting amplifier – Non Inverting amplifier – Voltage follower – summing amplifier – Rectifiers: working principle of half wave rectifier, full wave rectifier, bridge rectifier – UPS: components of UPS – working principle of UPS.

Total: 45 Hours

TEXT BOOKS

1. B. L. Theraja., “Fundamentals of Electrical Engineering & Electronics”, S. Chand & Co Ltd, 2015.
2. S. Padma et al., “Basic Electrical and Electronics Engineering”, Sonaversity, Sona College of Technology, Salem, Revised edition 2016.

REFERENCE BOOKS

1. Mehta.V. K, Rohit Metha, “Principles of Electrical Engineering and Electronics”, S. Chand & Co. Ltd, 2011.
2. S.K. Bhattacharya, ‘Electrical Machines’, Tata MC Graw Hill Publishing company ltd, Third edition, 2009.
3. R. Muthusubramanian, S.Salivahanan, “Basic Electrical and Electronics Engineering” 3rd Edition 2007, Tata McGraw-Hill publishing company limited.
4. D. Roy choudhury and Shail Jain, “Linear Integrated Circuits”, First edition, New age international 2011.

U15PCL107BR - PHYSICS AND CHEMISTRY LABORATORY I

(Common to CSE & IT Branches)

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. apply the principles of optics, thermal physics and elasticity to determine the engineering properties of materials.
2. analyse the given water sample to determine the amount of hardness and suggest the quality of water suitable for domestic purpose and determine the molecular weight of a polymer.
3. determine the thickness of the given copper turn used for house hold applications and evaluate the amount of alkalinity, pH, conductivity and iron content of house hold water sample and suggest the remedial measures for them.

List of Experiments (PHYSICS PART)

1. Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
2. Determination of the wavelength and velocity of ultrasonic waves and the compressibility of a given liquid using the ultrasonic interferometer.
3. Determination of thermal conductivity of a bad conductor using Lee's disc apparatus.
4. Determination of the angle and dispersive power of a given prism using a spectrometer.
5. Determination of laser wavelength, particle size (lycopodium powder), acceptance angle and numerical aperture of an optical fibre using a diode laser.
6. Determination of the Young's modulus of a given material by non-uniform bending method.

(Any five experiments may be conducted from the above list)

List of Experiments (CHEMISTRY PART)

1. Estimation of hardness of water by EDTA method.
2. Determination of molecular weight of a polymer by viscometric method.
3. Estimation of hydrochloric acid by pH metry.
4. Conductometric titration of strong acid vs strong base (HCl vs NaOH).
5. Estimation of ferrous iron by potentiometric titration (Fe^{2+} vs dichromate).
6. Estimation of corrosion in iron sheets by weight loss method.

(Any five experiments may be conducted from the above list)

Total: 30 Hours

U15CPL108AR - C PROGRAMMING LABORATORY

(Common to BE - CIVIL, CSE, EEE, Mech, Mechatronics & BTech FT, IT)

| L | T | P | C | M |
|---|---|---|---|-----|
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. design and develop simple programs using branching, looping statements, functions and arrays
2. develop programs using structures, strings, pointers and recursion
3. effectively choose programming components that efficiently solve computing problems in real-world

List of Experiments

1. Programs using Input, Output and assignment statements
2. Programs using Branching statements
3. Programs using Looping statements
4. Programs using Functions
5. Programs using one dimensional and two dimensional arrays
6. Programs using Structures
7. Programs using Strings
8. Programs using Pointers (both data pointers and function pointers)
9. Programs using Recursion

Total: 30 Hours

U15EPL109R - ENGINEERING PRACTICES LABORATORY

(Common to all Branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. plan the pipe connections using PVC, G.I pipes
2. analyze the process of wood separation with proper types of joints using tools and machines
3. demonstrate the method of material removal from metal components and assemble the components using sheet metals
4. demonstrate the working principles of house wiring and Fluorescent lamp wiring
5. analyze the functions of logic gates (AND, OR, NOT, NAND, NOR and Ex-OR)

List of Experiments

GROUP A (CIVIL & MECHANICAL)

1. CIVIL ENGINEERING PRACTICE

PLUMBING WORKS

- a. Basic pipe connections (PVC) involving the fittings like Valves, Taps, and Bends.
- b. Mixed pipe (PVC and G.I) connections involving the fitting like Valves, Taps, and Bends

CARPENTRY WORKS

- a. Planning
- b. Lap joint
- c. Cross lap joint

II MECHANICAL ENGINEERING PRACTICE

SHEET METAL WORK

- a. Square tray
- b. Funnel

FITTING WORK

- a. L joint
- b. V-joint
- c. Demonstration of Welding classes

GROUP B (ELECTRICAL & ELECTRONICS)

ELECTRICAL ENGINEERING

1. Study of Resistor, Inductor and capacitor-ratings-colour coding-series and parallel equivalence.
2. House wiring
3. Fluorescent lamp wiring.
4. Stair-case Wiring and Door bell wiring
5. Measurement of circuit parameters for RLC series circuit..
6. Measurement of Energy using Energy meter for Single Phase system.
7. Study of Fan and Iron Box.

ELECTRONICS ENGINEERING

1. Verification of Ohm's Law
2. Measurement of Amplitude and frequency of AC wave forms using CRO.
3. Verification of logic gates (AND, OR, NOT, NAND, NOR and ExOR).
4. Generation of Clock Signal using IC 555 timer.
5. Soldering practice - Components Devices and Circuits - Using general purpose PCB.
6. Study of Multimeter

Total: 45 Hours

SONA COLLEGE OF TECHNOLOGY, SALEM – 636 005
(An Autonomous Institution)

Courses of Study for BE / B Tech Semester II under Regulations 2015R (CBCS)
Branch: IT

| S.No. | Course Code | Course Title | L | T | P | C | Group code | |
|------------------------------------|-------------|---|---|---|---|---|------------|--|
| Theory | | | | | | | | |
| 1 | U15ENG201AR | Technical English –II | 2 | 0 | 2 | 3 | HS | |
| 2 | U15MAT202AR | Mathematics – II | 3 | 2 | 0 | 4 | BS | |
| 3 | U15PHY203BR | Physics of Materials # | 3 | 0 | 0 | 3 | BS | |
| 4 | U15CHE204AR | Environmental Science and Engineering [§] | 3 | 0 | 0 | 3 | BS | |
| 5 | U15PDS206R | Programming and Data Structures | 3 | 0 | 0 | 3 | ES | |
| 6 | U15EGR207R | Engineering Graphics ¹ | 2 | 2 | 0 | 3 | ES | |
| Practical | | | | | | | | |
| 7 | U15PCL208BR | Physics and Chemistry Laboratory – II ² | 0 | 0 | 2 | 1 | BS | |
| 8 | U15PDS209R | Programming and Data Structures Laboratory | 0 | 0 | 2 | 1 | ES | |
| 9 | U15BEEL210R | Basic Electrical and Electronics Engineering Laboratory | 0 | 0 | 2 | 1 | ES | |
| Total Credits | | | | | | | 22 | |
| Optional Language Elective* | | | | | | | | |
| 10 | U15OLE1201 | French | 0 | 0 | 2 | 1 | HS | |
| 11 | U15OLE1202 | German | | | | | | |
| 12 | U15OLE1203 | Japanese | | | | | | |

*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (over and above the CGPA calculation).

Common to CSE & IT branches

[§] Common to CSE & IT branches.

¹ The examination will be conducted for 3 hours both through written and practical mode.

² Laboratory classes on alternate weeks for Physics and Chemistry. The lab examination will be conducted separately for 50 marks each with 2 hours duration.

Approved by

| | | | |
|--|---|--|---|
| HOD-First Year Dr. M. Renuga | Chairman BOS/IT & HOD-IT Dr. J. Akilandeswari | Member Secretary, Academic Council Dr. R. Shivakumar | Chairperson, Academic Council & Principal Dr. S.R.R. Senthilkumar |
|--|---|--|---|

U15ENG201AR - TECHNICAL ENGLISH II

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 2 | 0 | 2 | 3 | 100 |

Course Outcomes

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

1. use grammatical components effectively in both written and spoken communication
2. develop speaking skills for self introduction, delivering speeches and technical presentation.
3. speak effectively in real time and business situations
4. write emails, formal letters and descriptions of graphics
5. develop skills for writing reports and proposals

UNIT I – FOCUS ON LANGUAGE

- Cause and effect expressions
- Concord
- If conditionals
- Articles
- Pronouns
- Adverbs
- Grammatical structures

UNIT II – SPEAKING-I

- Self introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town.
- Welcome address, vote of thanks, special address on specific topics.

UNIT III – SPEAKING – II

- Mini presentation in small groups of two or three regarding, office arrangements, facilities, office functions, sales, purchases, training recruitment, advertising, applying for financial assistance, applying for a job, team work, discussion, presentation

- Situational role play between examiner and candidate, teacher and student, customer and sales manager, hotel manager and organiser, team leader and team member, bank manager and candidate, interviewer and applicant, car driver and client, industrialist and candidate, receptionist and appointment seeker, new employee and manager, employee and employee, P.A. and manager, schedule for training, asking for directions, seeking help with office equipment, clarifying an error in the bill, job details, buying a product, selling a product, designing a website, cancelling and fixing appointments, hotel accommodation, training facilities, dress code, conference facilities.

UNIT IV – WRITING – I

- Email, fixing an appointment, Cancelling appointments, conference details, hotel accommodation, order for equipment, training programme details, paper submission for seminars and conferences
- Letter Writing, Business communication, quotations, placing orders, complaints, replies to queries from business customers, inviting dignitaries, accepting and declining invitations
- Resume / CV
- Transcoding: Flow Chart, Pie Chart, Graph, Bar Chart, Tabular Column.

UNIT V – WRITING -II

- Technical report writing, feasibility reports, accident reports, survey reports
- General purpose writing specifications of equipment, description of an object, National and International issues, answering general questions with special emphasis on seeking opinions
- Technical Writing: recommendations, checklists, instructions, note making and memo
- Proposal: establishing a lab, introducing a subject in the curriculum, training programme for students

Total: 45 Hours

Speaking test will be conducted for 20 marks externally and evaluated along with Technical English –II in the End Semester Valuation.

TEXT BOOK

Technical English – I & II, Dr. M. Renuga, et al. Sonaversity, Sona College of Technology, Salem, Revised edition, 2016.

EXTENSIVE READING

1. Who Moved my Cheese? – Spencer Johnson-G. P. Putnam’s Sons
2. “ Discover the Diamond in You” – Arindam Chaudhuri – Vikas Publishing House Pvt. Ltd.

REFERENCE BOOKS

1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2. A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

U15MAT202AR - MATHEMATICS II

(Common to Civil, Mech, Mechatronics, EEE, IT and FT Branches)

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 3 | 2 | 0 | 4 | 100 |

Course Outcomes

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

1. explain the different types of ordinary differential equations and describe the various methods to solve ordinary differential equations.
2. define and explain the vector functions, operators and discuss the methods of solving line, surface and volume integrals.
3. state the special features of function of a complex variable, properties and discuss the problems involving conformal mapping.
4. describe the power series expansion of a complex function and the procedures of evaluating the complex integral.
5. define laplace transform, its inverse, properties and solve an ordinary differential equation using laplace transform.

UNIT I – ORDINARY DIFFERENTIAL EQUATIONS

9+6

Linear higher order ordinary differential equations with constant coefficients – Cauchy’s and Legendre’s homogeneous linear ordinary differential equations – method of variation of parameters.

UNIT II – VECTOR CALCULUS

9+6

Vector differentiation: Scalar and vector valued functions, gradient, directional derivative, divergence and curl, scalar potential.

Vector integration: Line, surface and volume integrals, statement of Green’s, Stoke’s and Gauss divergence theorems, simple applications involving squares, rectangles, cubes and rectangular parallelepiped.

UNIT III – ANALYTIC FUNCTIONS

9+6

Function of a complex variable, analytic function, necessary conditions and sufficient conditions (excluding proof), properties of an analytic function, harmonic conjugate, construction of an analytic function by Milne’s Thomson method, conformal mapping: $w = z + c$, cz , $1/z$ and bilinear transformation.

UNIT IV – COMPLEX INTEGRATION

9+6

Statement of Cauchy's integral theorem and Cauchy's integral formula, simple applications, Taylor's and Laurent's expansions, singular points, residues, statement of Cauchy's residue theorem, evaluation of contour integration over unit circle and semi circle (excluding poles on real axis).

UNIT V – LAPLACE TRANSFORM

9+6

Laplace transform: conditions for existence, transform of elementary functions, basic properties, transform of derivatives and integrals, transform of unit step function and impulse function, transform of periodic functions.

Inverse Laplace transform: standard results – statement of convolution theorem and its applications, initial and final value theorems, solution of linear second order ordinary differential equations with constant coefficients using Laplace transformation.

Total: 75 Hours

TEXT BOOKS

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. T. Veerarajan, "Engineering Mathematics"(I Year), Tata McGraw Hill, 4th Edition, 2011.

REFERENCE BOOKS

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Engineering Mathematics", (for first Year), S. Chand and Co., Ltd., Revised Edition 2011.
2. E. Kreyszig., "Advanced Engineering Mathematics", John Wiley and Sons (Wiley Student Edition), 10th Edition, 2011.
3. S.Karthikeyan, R. Rajeswari, P. Senthilvadivu and R.Shivakumar, "Vector Calculus and Complex Analysis", Sonaversity, Revised Edition, 2017.
4. N. P. Bali, M. Goyal, "Engineering Mathematics", University Science Press, New Delhi, 9th Edition, 2011.

U15PHY203BR - PHYSICS OF MATERIALS

(Common to CSE and IT)

| L | T | P | C | M |
|---|---|---|---|-----|
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. calculate electrical and thermal conductivity of conducting materials.
2. classify semiconductors and analyze the variation of Fermi level with temperature and examine the nature of charge carriers.
3. compare the types of magnetic materials and explain their applications in data storage devices.
4. illustrate the optical data storage techniques and different display devices.
5. describe the significance of nano scale and their applications in the field of quantum computing.

UNIT I – ELECTRICAL PROPERTIES OF MATERIALS

9

Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –band theory of solids (qualitative treatment only) - Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals.

UNIT II – SEMICONDUCTOR PHYSICS

9

Intrinsic semiconductors – Energy band diagram – direct and indirect band gap semiconductors -Carrier concentration in intrinsic semiconductors - Fermi level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination– Extrinsic semiconductors – Carrier concentration in N-type and P-type semiconductors (Qualitative Treatment only)– Variation of Fermi level with temperature and impurity concentration – Compound semiconductors – Hall effect –Determination of Hall coefficient – Hall effect applications – Ohmic contacts – Schottky diode.

UNIT III – MAGNETIC PROPERTIES OF MATERIALS

9

Classification of magnetic materials – Quantum numbers – Magnetic moment – Classical theory of diamagnetism (Langevin theory) – Theory of paramagnetism – Ferromagnetism (Weiss theory) – Anti ferromagnetic materials – Ferrites – Hard and soft magnetic

materials – Magnetic recording materials – Bubble memory – Magnetic principle in computer data storage – Magnetic tape – Floppy disc – Magnetic hard disc.

UNIT IV – OPTICAL PROPERTIES OF MATERIALS

9

Classification of optical materials – Absorption in metals, insulators & Semiconductors - LED's – Organic LED's – Polymer light emitting materials – Plasma light emitting devices – LCD's –Optical data storage techniques in DVD and Blue -ray disc - Holographic data storage.

UNIT V – NANO MATERIALS

9

Nanoscience and Nanotechnology – significance of the nanoscale – Quantum confinement effect - different types of nanostructures (Confinement Dimensions 0-D, 1-D, 2-D and 3-D) – Categories of nanomaterials – Fabrication of nanomaterials – Ball milling method and Chemical vapour deposition technique - Quantum size effect in metal or semiconductor nanoparticles - Quantum structures – Metal-to-insulator transition – Confining excitons – Band gap of nanomaterials – Tunneling – Resonant Tunneling Diodes (RTD's) – Single electron phenomena – Single electron transistor – Basic concepts of spintronics.

Total: 45 Hours

TEXTBOOKS

1. S.O. Kasap, “Principles of Electronic Materials and Devices”, Tata McGraw-Hill, 2007.
2. P.K. Palanisamy, “Materials Science”, Scitech, 2003.

REFERENCE BOOKS

1. C.Shanthi et. al. ‘Physics of Materials’, Sonaversity, Sona College of Technology, Salem (Revised edition, 2015).
2. R.F. Pierret, “Semiconductor Device Fundamentals”, Pearson, 1996.
3. N. Garcia and A. Damask, “Physics for Computer Science Students”, Springer-Verlag, 1991.
4. B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi, 2012.

U15CHE204AR - ENVIRONMENTAL SCIENCE AND ENGINEERING

(Common to CSE and IT Branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

- state the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water, mineral, food, and energy and land resources.
- explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
- define the various known kinds of environmental pollution and discuss their causes, effects and control measures.
- describe the safe disposal of hazardous wastes and waste water treatment.
- give an account of the social issues with regard to the environment.
- discuss the impact of human population on the environment.

UNIT I – INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 12

Definition, Scope and Importance – Need for public awareness – Forest Resources:- Use and over - exploitation, deforestation, Case Studies, Timber Extraction, Dams, Benefits and their effects on forests and tribal people - Water Resources:- Use and Over - Utilization of Surface and ground water, Floods, Drought, Conflicts Over Water – Mineral Resources:- Use–Environmental Effects of Extracting and Using Mineral Resources – Food Resources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer- Pesticide Problems, Water Logging, salinity – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources – Land Resources:- Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources.

UNIT II – ECOSYSTEMS AND BIODIVERSITY 9

Concepts of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Biogeochemical Processes - Ecological Succession – Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – 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.

UNIT III – ENVIRONMENTAL POLLUTION

10

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of Urban and Industrial Wastes, hazardous wastes and biomedical wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management:- Floods, Earthquake, Cyclone and Landslides, Waste water treatment methods, Green chemistry – principles and applications.

UNIT IV – SOCIAL ISSUES AND THE ENVIRONMENT

8

Sustainable Development – Urban Problems Related To energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People, its Problems and Concerns – Environmental Ethics:- Issues and Possible Solutions – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion - Nuclear Accidents and Holocaust, Case Studies – Wasteland Reclamation – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues Involved in enforcement of Environmental Legislation – Public Awareness.

UNIT V – HUMAN POPULATION AND THE ENVIRONMENT

6

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – environment and Human Health – Human Rights – Value Education – HIV /AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

Total : 45 Hours

TEXT BOOKS

1. Miller, T.G. Jr., “Environmental Science”, Wadsworth Pub. Co.
2. “Environmental Science and Engineering” by Anubha Kaushik and Kaushik, New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

REFERENCE BOOKS

1. S. Radjarejseri et al., “Environmental Science and Engineering” Sonaversity, Sona College of Technology, Salem, Revised Edition 2018.
2. Masters, G.M., “Introduction to Environmental Engineering and Science”, Pearson Education Pvt., Ltd., 2nd Edition, 2004.
3. Erach, B., “The Biodiversity of India”, Mapin Publishing P.Ltd., Ahmedabad, India.
4. Erach Bharucha, “Textbook of Environmental Studies for Undergraduate Courses”, 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

U15PDS206R - PROGRAMMING AND DATA STRUCTURES

(Circuit Branches: CSE, IT, EEE)

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 3 | 0 | 0 | 3 | 100 |

Course Outcomes

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

1. select suitable language features to solve and implement real-time problems.
2. write c programs to demonstrate file concepts.
3. design and develop real-time scenario using lists.
4. write c programs to manipulate stack data structure.
5. apply queue data structure for solving problems.

UNIT I – POINTERS AND OTHER FEATURES OF C

9

Pointers – Arrays and Pointers – Pointers and Strings – Pointer and Address Arithmetic – Two dimensional Arrays and Pointers – pointers to Functions – Dynamic memory Allocation – Structures and Unions – Enumeration Types – Bitfields.

UNIT II –FILE MANIPULATIONS

9

File Manipulations- File operations – Open, Read, Write and Close, Binary files and text files, Input and out file redirection – Stdin and Stdout and Command line arguments.

UNIT III –LISTS

9

LISTS – Abstract Data Types (ADT) – List ADT - Array implementation of lists – Linked List And their Operations – Doubly Linked List, Circularly Linked List – Polynomial Manipulation using Linked List.

UNIT IV – STACK

9

STACK ADT – Array and Linked List Implementation of Stack – Stack Operations – Stack Applications: Balancing Symbols, Postfix Expression Evaluation, Infix to Postfix Conversion and Function calls.

QUEUE ADT – Array and Linked List Implementation of Queues – Queue Operations – Circular Queues – Double ended Queues – Applications of Queues.

Total: 45 Hours

TEXT BOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”.2nd Edition, Pearson Education, 1988.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1996.

REFERENCE BOOKS

1. Reema Thareja, “Data Structures Using C”, Oxford University Press, 2nd Edition, 2014.
2. Aho, Hopcroft and Ullman, ”Data Structures and Algorithms”, Pearson Education. 1983.
3. Byron S Gottfried, “Programming with C”, Schaum’s Outlines”, Second Edition. Tata McGraw-Hill, 2006.
4. Yashavant P.Kanetkar. “Let Us C”, BPB Publications, 14th Edition, 2016.
5. Deitel and Deitel, “C How to Program”, Pearson Education, 8th Edition, 2016.

U15EGR207R - ENGINEERING GRAPHICS

| | | | | |
|---|---|---|---|-----|
| L | T | P | C | M |
| 2 | 2 | 0 | 3 | 100 |

Course Outcomes

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

1. predict the construction of various curves in civil elevation plan and machine components.
2. draw the projection of three dimensional objects representation of machine structure and explain standards of orthographic views by different methods.
3. analyze the principles of projection of various planes by different angle to project points, lines and planes.
4. draw the principles of projection of simple solid by the axis is inclined to one reference plane by change of position method.
5. plan the interior components of machinery (or) buildings by sectioning the solid, and to study the development of simple solids for fabrication of sheet metals.

CONCEPTS AND CONVENTIONS (Not for Examination) 2

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

COMPUTER AIDED DRAFTING (Not for Examination) 6

Importance 2d Drafting, sketching, modifying, transforming and dimensioning

UNIT I – PLANE CURVES (Free hand sketching) 10

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.

UNIT II – ISOMETRIC TO ORTHOGRAPHIC VIEWS (Free Hand Sketching) 10

Representation of three dimensional objects – General Principles of Orthographic projection – Need for importance of multiple views and their placement – First angle

projection – layout of views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT III – PROJECTION OF POINTS, LINES AND PLANE SURFACES

(Free hand sketching and 2D Software) 10

Projection of points – Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT IV – PROJECTION OF SOLIDS (Free hand sketching and 2D Software)

12

Projection of simple solids like prisms – pyramids – cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT V – SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

(Free hand sketching and 2D Software) 10

Sectioning of simple solids like prisms – pyramids cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – (Obtaining true shape of section is not required). Development of lateral surfaces of simple and truncated solids – Prisms – pyramids – cylinders and cones.

Total: 60 Hours

TEXT BOOKS

1. Engineering Graphics and Drawing, Sonaversity, Sona College of Technology, Salem, Revised edition, 2012.
2. Engineering Graphics by K.V.Natarajan, Chennai, 17th edition 2003.

REFERENCE BOOKS

1. Dhananjay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited, 2008.
2. Basant Agarwal and Agarwal C.M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. K. R. Gopalakrishnana, Engineering Drawing (Vol. I & II), Subhas Publications
4. Bertoline & Wiebe fundamentals of graphics communication III edition McGrawhill 2002.

U15PCL208BR - PHYSICS AND CHEMISTRY LABORATORY II

(Common to CSE and IT Branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. apply the principles of optics, electricity and elasticity to determine the engineering properties of materials.
2. evaluate the amount of iron content in the given sample using spectrophotometry, analyze the amount of chloride in a domestic water sample and analyse the quality of brass by estimating copper.
3. determine the resistivity of the given fuse wire used for house hold applications and determine the dissolved oxygen in two different water samples collected from the students residential areas.

LIST OF EXPERIMENTS (PHYSICS PART)

1. Determination of rigidity modulus of the material using torsion pendulum.
2. Determination of specific resistance of a given wire using Carey-Foster's bridge.
3. Determination of Young's modulus of the material by non-uniform bending method.
4. Determination of wavelength of the spectral lines in the mercury spectrum using a spectrometer.
5. Determination of band gap of a semiconductor diode.
6. Determination of coefficient of viscosity of the given liquid using Poiseuille's method

(Any five experiments may be conducted from the above list)

LIST OF EXPERIMENTS (CHEMISTRY PART)

1. Determination of dissolved oxygen in water by Winkler's method.
2. Estimation of chromium in waste water.
3. Determination of fluoride in water.
4. Estimation of iron in water by spectrophotometric method.
5. Estimation of chloride in water by argentometric method.
6. Estimation of copper in brass solution by EDTA method.

(Any five experiments may be conducted from the above list)

Total: 30 Hours

U15PDS209R - PROGRAMMING AND DATA STRUCTURES LABORATORY

(Circuit Branches: CSE, IT, EEE)

| L | T | P | C | M |
|---|---|---|---|-----|
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. write c programs to solve problems using appropriate language features.
2. write programs to handle files.
3. write programs to implement operations and applications of linear data structures.

Write C programs for the following. The faculty concerned will add the suitable scenario based questions for the concepts and that must be shared during the lab classes. (Compiler/IDE: GCC / Code::Blocks)

1. Functions (includes Pass by value, Pass by reference and recursive functions)
2. Pointer manipulations
3. File Handling in C
4. Programs using command line arguments.
5. Singly Linked list and its operations.
6. Circular linked list and its operations.
7. Doubly Linked List and its manipulations.
8. Implement stack and its applications using arrays and linked list.
9. Implement Queues using arrays and linked list

Total: 30 Hours

U15BEEL210R - BASIC ELECTRICAL AND ELECTRONICS LABORATORY

(Common to CSE & IT Branches)

| L | T | P | C | M |
|---|---|---|---|-----|
| 0 | 0 | 2 | 1 | 100 |

Course Outcomes

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

1. apply the basic circuit laws for calculating various parameters of dc and ac circuits
2. analysis the performance characteristics of electronic devices such as pn diode, zener diode, bjt and op-amp.
3. design the circuit for various applications using electronic devices.

LIST OF EXPERIMENTS

1. Verification of Ohm's Law.
2. Verification of Kirchhoff's Law.
3. Measurement of Power and Power factor for RLC circuit.
4. Frequency response of RLC Resonance circuit.
5. VI Characteristics of PN Junction Diode.
6. VI Characteristics of Zener Diode.
7. VI Characteristics of BJT in CB configuration.
8. VI Characteristics of BJT in CE configuration.
9. VI Characteristics of BJT in CC configuration.
10. Characteristics of Operational amplifier as Inverting and Non-Inverting amplifier.
11. Measurement of ripple factor for Half wave and Full wave rectifier circuit.
12. Study of working principle of DC generator.

Total: 30 Hours

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|--------------------------------------|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15MAT301ER | Discrete Mathematics | 3 | 2 | 0 | 4 |
| 2 | U15IT301R | Advanced Data Structures | 3 | 0 | 0 | 3 |
| 3 | U15IT302R | Digital Logic Design | 3 | 0 | 0 | 3 |
| 4 | U15IT303R | Principles of Communication | 3 | 0 | 0 | 3 |
| 5 | U15IT304R | Object Oriented Programming in C++ | 3 | 0 | 0 | 3 |
| 6 | U15IT305R | Computer Architecture | 3 | 0 | 0 | 3 |
| Practical | | | | | | |
| 7 | U15IT306R | Data Structures using C++ Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15IT307R | Digital Logic Design Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15ENG301R | Communications Skill Laboratory | 0 | 0 | 2 | 1 |
| 10 | U15GE301R | Soft Skills and Aptitude - I | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 24 |

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/Information Technology, Third Semester BE IT Students and Staff, COE

COURSE OUTCOMES

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

1. Explain and apply symbolic logic, construct truth tables and discuss validity of the arguments.
2. Apply predicates and arrive at the conclusions of the complicated logical problems
3. Apply the concepts of combinatorics, to solve the real world problems.
4. Outline the concepts of relations and functions and use them to solve problems.
5. Apply the concept of lattices and Boolean algebra to solve problems.

UNIT I PROPOSITIONAL CALCULUS 15

Propositions – logical connectives – compound propositions – conditional and biconditional propositions – truth tables – tautologies and contradictions – contrapositive – logical equivalences and implications – DeMorgan’s laws – normal forms – principal conjunctive and disjunctive normal forms – rules of inference – arguments – validity of arguments.

UNIT II PREDICATE CALCULUS 15

Predicates – statement function – variables – free and bound variables – quantifiers – universe of discourse – logical equivalences and implications for quantified statements – theory of inference – the rules of universal specification and generalization – validity of arguments.

UNIT III COMBINATORICS 15

Counting principle – sum rule, product rule – pigeonhole principle – permutations and combinations – mathematical induction – recurrence relation – solution of recurrence relation using generating functions.

UNIT IV RELATIONS AND FUNCTIONS 15

Relations - types of relations and their properties - relational matrix and graph of a relation - partitions – equivalence relations

Functions – classification – types of functions and examples – composition of functions – inverse functions – characteristic function of a set

UNIT V LATTICES AND BOOLEAN ALGEBRA 15

Introduction – poset – Hasse diagram – Lattices and their properties – duality principle- sublattices – some special Lattices – Boolean algebra and its properties – expression of a Boolean function in canonical form (truth table method and algebraic method)

Lecture: 45 hours Tutorial: 30 hours

Total: 75 hours

Text Book:

1. Kenneth H.Rosen, “Discrete Mathematics and its Applications”, Seventh Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2015.
2. Trembly J. P and Manohar R, “Discrete Mathematical Structures with Applications to Computer Science”, 30th Re-print, Tata McGraw–HillPub. Co. Ltd, New Delhi, 2007

References:

1. Veerarajan T. “Discrete Mathematics with Graph Theory and Combinatorics”, Nineteenth reprint, McGraw Hill Education (India) Private Ltd, New Delhi, 2014.
2. Rahothishaman.R., Ponnalagu.K., Shakthivel.R., “Discrete Mathematics” 6th Edition, Sonaversity, 2011.
3. Ralph. P.Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fifth Edition, Pearson Education Asia, Delhi, 2004.

COURSE OUTCOMES

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

1. Analyze simple algorithms and implement Tree ADT and apply it to construct expression trees.
2. Implement variants of different tree data structure.
3. Apply and implement heap
4. Develop algorithms using sets and hashing.
5. Develop and apply algorithms for real applications using graphs.

UNIT I ALGORITHM ANALYSIS & TREE STRUCTURES 9

Algorithm Analysis – Asymptotic Notations-Time complexity –Space complexity- Preliminaries of Trees - Implementation of Trees – Tree Traversals with an Application - Binary Trees – Implementation - Expression trees.

UNIT II TREE VARIANTS 9

Binary Search Tree ADT –AVL trees – Splaying- B+ trees.

UNIT III BINARY HEAP 9

Priority Queue- Model -Simple Implementations –Binary Heap – Basic Heap Operations – Other Heap Operations - Applications of Priority Queues.

UNIT IV HASHING AND SETS 9

Hashing –General idea - Hash Function- Separate Chaining – Open Addressing – Linear Probing - Quadratic Probing- Double Hashing - Rehashing – Extendible Hashing – Disjoint Set ADT – Equivalence Relations- Dynamic Equivalence Problem – Basic Data structure- Smart Union Algorithms – Path Compression – An Application.

UNIT V GRAPHS 9

Definitions – Representation of Graphs – Traversals – Breadth First Search - Depth-first Search - Topological Sort – Shortest-path Algorithms – Unweighted Shortest Paths - Dijkstra’s Algorithm- Minimum Spanning Tree – Prim's and Kruskal's.

Total : 45 hours

TEXT BOOK

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C++”, Fourth Edition, Pearson Education, 2014.

REFERENCES

1. Richard F.Gilberg and Behrouz A.Forouzan, “Data Structures – A Pseudo code Approach with C++”, THOMAS ASIA, 2005.
2. Yedidyah Langsan, Moshe J. Augenstein And Aaron M. Tanenbaum,“ Data Structures using C and C++”, Prentice-Hall of India Pvt Ltd, 2004
3. Sartaj Sahni, “ Data Structures, Algorithm and Application in C++”, 2nd edition, Silicon Press, 2004.
4. Michael T.Goodrich, R.Tamassia and Mount “Data structures and Algorithms in C++”, 2nd edition, Wiley , 2011.

COURSE OUTCOMES

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

1. Simplify the Boolean expression using K-Map and tabulation techniques.
2. Use Boolean simplification techniques to design a combinational circuit.
3. Analysis and Design of a given combinational digital/logic circuits.
4. Analysis and Design of a given sequential digital/logic circuits.
5. Design of programmable logic devices.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of Number systems – Complements - Digital Logic gates - Basic theorems and properties of Boolean algebra - Boolean functions – Canonical and Standard forms -Simplifications of Boolean functions using Karnaugh map – three variable, Four variable and Five variable – Product of sum simplification- Don't care conditions – Quine McCluskey(QM) method.

UNIT II COMBINATIONAL LOGIC 9

Combinational circuits – Analysis and design procedures - Code conversion – Binary to Gray, Gray to Binary – BCD to Excess - 3, Excess - 3 to BCD- Circuits for arithmetic operations –Half Adder – Full Adder - Binary Adder– Half subtractor – Full subtractor – Binary subtractor- BCD adder- Binary Multiplier – Magnitude comparator.

UNIT III MSI LOGIC CIRCUITS AND PROGRAMMABLE LOGIC 9

Decoders – combinational logic implementation using decoder – Encoders- Priority encoder-Multiplexers- Boolean function Implementation using multiplexer – Demultiplexer - Programmable logic Array – Implementation of Boolean functions with PLA - Programmable Array logic. Implementation of Boolean functions with PAL.

UNIT IV SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Flip flops – RS, JK, D, T - Analysis of clocked sequential circuits –State equations, State Table, State diagram - Analysis with D, JK and T Flip flops – State reduction and state assignment - Design procedures – Synthesis using D, JK and T – Binary Ripple Counters – Binary Synchronous Counters.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC 9

Introduction- Analysis procedure – Transition Table – Flow Table – Race condition- Circuit with latches – Design procedure of asynchronous sequential circuit - Reduction of state and flow tables – Race-free state assignment – Hazards –Hazards in Combinational Circuits -Hazards in Sequential Circuits.

Total : 45 hours

TEXT BOOK

1. M.Morris Mano, Michel D. Ciletti, and John F.Walerly “Digital Design”, 5th edition, Pearson Education, 2013.

REFERENCES

1. Larry L Kinney and Charles H.Roth Jr, "Fundamentals of Logic Design", 5th edition, Jaico Publishing House, 2015.
2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007.
3. Donald P.Leach, Albert Paul Malvino and Saha, "Digital Principles and Applications", 8th edition, TMH, 2014.
4. G.K.Kharate, "Digital Electronics", Oxford University press, 2012.
5. John F.Wakerly, "Digital Principles and practices", 4th edition, Pearson Education, 2013.

COURSE OUTCOMES

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

1. Explain and apply various types of modulation and demodulation in analog and digital communication.
2. Describe the concept of digital communication techniques.
3. Describe the concept of various digital transmission techniques.
4. Comprehend the Cellular communication techniques.
5. Explain the concepts of Satellite and Optical communication.

UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION 9

Principles of amplitude modulation - AM envelope - frequency spectrum and bandwidth - modulation index and percent modulation - AM Voltage distribution - AM power 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.

UNIT II DIGITAL COMMUNICATION 9

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 – BPSK , QPSK ,8-PSK - Quadrature Amplitude modulation – 8-QAM - bandwidth efficiency - Carrier recovery – squaring loop, Costas loop - DPSK.

UNIT III DIGITAL TRANSMISSION 9

Pulse modulation - PCM – PCM sampling - Sampling rate - Signal to Quantization noise rate - Companding- analog and digital - Delta modulation PCM - Adaptive Delta modulation PCM - Differential PCM - Intersymbol interference - Eye patterns.

UNIT IV CELLULAR COMMUNICATION 9

Fundamental concept of Cellular telephone - Frequency reuse, Interference - Co-channel Interference, Adjacent channel Interference - Cell splitting - Cell sectoring - Segmentation and Dualization - Roaming and Handoff.

UNIT V SATELLITE AND OPTICAL COMMUNICATION 9

Kepler's Law - Satellite Orbits - Geo synchronous satellites - satellite system link models -Optical Fiber Communication system - Optical Fiber configurations - Optical Fiber classification Losses in Optical fiber cables - Optical sources - LED , Injection laser diode - Light detector - PIN diodes, Avalanche photo diode.

Total : 45 hours

TEXT BOOK

1. Wayne Tomasi, "Electronic Communication Systems Fundamentals through Advanced", 6th Edition, Pearson Education, 2008.

REFERENCES

1. H.Taub,D L Schilling ,G Saha ,”Principles of Communication”, 3rd edition, 2008.
2. B.P.Lathi,”Modern Analog and Digital Communication systems”, 6th edition, Oxford University Press, 2008.
3. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2002.
4. Martin S.Roden, “Analog and Digital Communication System”, 3rd edition, PHI, 2002.
5. B.Sklar,”Digital Communication Fundamentals and Applications”, 2nd edition, Pearson Education, 2007.
6. Simon Haykin, “Communication Systems”, 5th edition, John Wiley & Sons. 2010.

COURSE OUTCOMES

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

1. Explain fundamental programming concepts such as variables, conditional statements, looping constructs, and methods (procedures), inline function, friend function.
2. Describe how the class mechanism supports encapsulation and information hiding
3. Apply the concept of constructors, destructors and operator overloading.
4. Apply templates and inheritance mechanism in applications.
5. Write C++ programs for applications using files and exceptions.

UNIT I OBJECT ORIENTED CONCEPTS 9

Introduction to Object Oriented Programming and C++: Object oriented concepts and its characteristics: abstraction, encapsulation, inheritance, and polymorphism. History of C++ - Structure of C++-Applications of C++- Tokens- Keywords- Identifiers-Basic data types- Derived data types- Symbolic constants- Dynamic initialization -Reference variables- Scope resolution operator-Type modifiers- Type casting.

C++ Operators and control statements- Input and output statements- Function Prototyping-Function components- Passing parameters - call by reference, return by reference- Inline function- Default arguments - Overloaded function- Introduction to friend function.

UNIT II CLASSES AND OBJECTS, CONSTRUCTORS AND DESTRUCTORS 9

Classes and Objects: Class specification- Member function definition- Nested member function- Access qualifiers- Static data members and member functions - Instance creation- Array of objects- Dynamic objects-Static Objects- Objects as arguments- Returning objects.

Constructors and Destructors: Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors- Destructors.

UNIT III POLYMORPHISM 9

Operator Overloading: Operator function – Overloading unary and binary operator-Overloading binary operator using friend function - Type Conversion.

Virtual Function: Definition – Runtime Polymorphism – Array of pointers to base class – virtual functions - Pure virtual functions – Virtual Destructors.

UNIT IV INHERITANCE AND TEMPLATES 9

Inheritance: Defining Derived classes- Single Inheritance- Protected Data with private inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance-Multipath inheritance-Virtual Base Classes- Abstract classes -Constructors in derived class- Member Classes

Generic Programming with Templates: Introduction, class templates – class templates with multiple parameters - Function templates, Function templates with multiple parameters- overloading of function templates, Member function Templates, Non-Type Template Arguments- Inheritance of class template.

Streams: Streams in C++- Stream classes- Formatted and unformatted data- Manipulators- User defined manipulators- File streams-File pointer and manipulation-File open and close- Sequential and random access-Name Space.

Exception Handling: Principle of exception handling-Exception handling mechanism, multiple catch, nested try, rethrowing the exception – specifying exceptions.

Total: 45 hours

TEXT BOOK

1. Robert Lafore, “Object-Oriented Programming in C++” Pearson Education, 4 Edition, 2008.
2. K R Venugopal, Rajkumar Buyya “Mastering C++” Tata McGraw Hill, New Delhi, Second edition 2015.

REFERENCES

1. H. M. Deitel, P. J. Deitel, “ C++ How to Program”, Fifth Edition, Deitel & Associates, Inc.
2. Nicholas A. Solter, Scott J. Kleper, “Professional C++”, 3rd Edition, Wiley Publishing,
3. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004.
4. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
5. B. Stroustrup, “The C++ Programming language”, 3rd edition, Pearson Education, 2004.
6. E. Balaguruswamy, “Object-Oriented Programming with C++” Tata McGraw Hill, New Delhi, Sixth edition 2015.

COURSE OUTCOMES:

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

1. Explain the processor design concepts in modern computer architecture.
2. Discuss the operations and instruction sequences in a basic computer.
3. Explain different types of control unit and the concept of pipelining.
4. Describe the hierarchical memory system including cache memory and virtual memory.
5. List and explain different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Software – Performance and metrics – Multiprocessors and Multicomputer – Memory Locations and Addresses– Instructions and instruction sequencing – Addressing modes – Fixed point and Floating point representations.

UNIT II BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control: Micro Instructions- Micro Instructions with next address field.

UNIT III PIPELINING 9

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

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed Size and cost – Cache memories – performance consideration – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

I/O devices - Accessing I/O devices – Programmed Input/output – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB)– Processor Families.

Total : 45 hours

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, 5th edition, McGraw Hill Education, 2011.

REFERENCES

1. M. Morris Mano, “Computer System Architecture”, 3rd edition, Pearson Education, 2007.
2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, 5th edition, Elsevier, 2013.
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 10th edition, Pearson Education, 2015.
4. B. Govindarajalu, “Computer Architecture and Organization: Design Principles and Applications”, 2nd edition, McGraw Hill Education, 2010.

COURSE OUTCOMES

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

1. Implement the basic concept of C++ such as Polymorphism, Inheritance, Friend and virtual Function
2. Implement operations of tree data structure.
3. Implement Hash tables and implement Kruskal's algorithm, depth-first and breadth first search algorithms in graph data structure.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default argument
2. Practice of Dynamic memory allocation using constructor, destructor, copy constructor.
3. Practice of C++ concepts such as Polymorphism, Inheritance, Friend and virtual Function.
4. Implementation of an expression tree. Produce its prefix, infix and postfix expressions.
5. Use class template to Implement Binary Search Tree.
6. Implementation of Priority Queue.
7. Implementation of Hashing Techniques.
8. Implementation of Depth first traversal and Breadth first traversal.
9. Implementation of B+-Trees.
10. Implementation of Kruskal's Algorithm.

Total: 60 hours

COURSE OUTCOMES

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

1. Use Boolean simplification techniques to design and construct simple Boolean theorems and functions.
2. Design and implement combinational and sequential circuits.
3. Design the different functional units in a digital computer system.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Design and implementation of Binary to Gray and Gray to Binary code converters.
4. Design and implementation of Half adder / Half subtractor, Full adder / Full subtractor using basic gates.
5. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
6. Design and implementation of parity generator / checker using basic gates and MSI devices.
7. Design and implementation of magnitude comparator.
8. Design and implementation of Decoders and encoders.
9. Design and implementation of Multiplexers/Demultiplexers.
10. Design and implementation of Shift registers.
11. Design and implementation of Synchronous counters.
12. Design and implementation of Asynchronous counters.

Total: 30 hours

| Semester-III | U15GE301R:SOFT SKILLS AND APTITUDE – I | L | T | P | C | Marks |
|---|---|---|---|---|---|-------|
| | | 0 | 0 | 2 | 1 | 100 |
| Course Outcomes | | | | | | |
| At the end of the course the student will be able to: | | | | | | |
| 1. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches | | | | | | |
| 2. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning | | | | | | |
| 3. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics | | | | | | |
| 1.Soft Skills | Demonstrating soft-skill capabilities with reference to the following topics: <ol style="list-style-type: none"> Attitude building Dealing with criticism Innovation and creativity Problem solving and decision making Public speaking Group discussions | | | | | |
| 2. Quantitative Aptitude and Logical Reasoning | Solving problems with reference to the following topics: <ol style="list-style-type: none"> Numbers: Finding units digit, Power rule Base system – Progressions: Arithmetic, geometric and harmonic HCF and LCM Averages Percentages Ratio and proportion Ages Partnership Profit and loss Mensuration: Area, perimeter, volume and Surface area Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language Direction Sense Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric Seating arrangement | | | | | |
| 3. Verbal Aptitude | Demonstrating English language skills with reference to the following topics: <ol style="list-style-type: none"> Verbal analogy Tenses Prepositions Reading comprehension Choosing correct / incorrect sentences Describing pictures | | | | | |

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester IV under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|---|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15MAT401ER | Probability and Statistics | 3 | 2 | 0 | 4 |
| 2 | U15IT401R | Operating Systems | 3 | 0 | 2 | 4 |
| 3 | U15IT402R | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 |
| 4 | U15IT403R | Design and Analysis of Algorithms | 3 | 0 | 2 | 4 |
| 5 | U15IT404R | Software Engineering | 3 | 0 | 0 | 3 |
| 6 | U15IT405R | Java Programming | 3 | 0 | 0 | 3 |
| Practical | | | | | | |
| 7 | U15IT406R | Java Programming Laboratory | 0 | 0 | 2 | 1 |
| 8 | U15IT407R | Microprocessors and Microcontrollers Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15GE401R | Soft Skills and Aptitude - II | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 24 |

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/Information Technology, Fourth Semester BE IT Students and Staff, COE

COURSE OUTCOMES

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

1. State axioms of probability, explain the concepts, define random variable, and discuss their properties.
2. Give brief accounts of standard distributions, state the properties and define functions of random variable.
3. Define and explain two dimensional random variables, explain the concepts covariance, correlation and regression and discuss transformation of random variables.
4. Define the sampling distribution, test and analyse the hypothesis for mean, variance, proportions and differences using Normal, t, Chi-Square and F-distributions and also test and analyse the independence of attributes and goodness of fit.
5. Define simple correlation and regression, analyse these measures, define multiple and partial correlation and regression and also analyse these measures.

UNIT - I PROBABILITY AND RANDOM VARIABLE 12

Axioms of probability, conditional probability, total probability, Bayes theorem, random variable, probability mass function, probability density function, properties, Moment generating functions and their properties.

UNIT - II STANDARD DISTRIBUTIONS 12

Binomial, Poisson, geometric, uniform, exponential and normal distributions and their properties, functions of a random variable.

UNIT - III TWO DIMENSIONAL RANDOM VARIABLES 12

Joint distributions, marginal and conditional distributions, covariance, transformation of random variables, Central limit theorem.

UNIT IV TESTING OF SIGNIFICANCE 12

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT - V CORRELATION AND REGRESSION 12

Correlation (simple and rank correlation) and regression, multiple and partial correlations, partial and multiple regression.

Lecture: 45 hours Tutorial: 30 hours Total: 75 hours

TEXT BOOKS

1. “Probability and Statistics”, by Sonaversity, 2014.
2. Johnson R.A., and Gupta C.B., “Miller and Freund’s, “Probability and Statistics for Engineer’s”, Pearson Education, Asia, 7th edition, 2007.
3. Veerarajan T., “Probability, Statistics and Random Processes”, Tata McGraw-Hill, New Delhi, 2nd edition, 2003.

REFERENCE BOOKS

1. Ross S., “A first course in probability”, Pearson Education, Delhi, 6th edition, 2002.

COURSE OUTCOMES

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

1. Explain structures of Operating System.
2. Apply fundamental Operating System abstractions such as processes, process scheduling, Semaphores, IPC abstractions, shared memory regions, deadlock and threads.
3. Explain the principles of concurrency and synchronization, and apply them to write concurrent programs/software.
4. Implement basic resource management techniques (scheduling or time management, space management) and principles.
5. Describe the types of I/O management, disk scheduling, disk management and swap space management.

UNIT I INTRODUCTION 9

Introduction – What Operating System Do – Operating System Structure – Operating system Operations – Operating System Components: Process Management – Memory Management – Storage Management – I/O Management – Network Management - Protection and Security.

Classes of Operating Systems: Mainframe Systems – Single Processor System - Multiprocessor Systems - Desktop Systems — Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems - Open Source Operating Systems.

Operating System Structures: Operating System Services – User and Operating System Interface – System Calls – Types of System Calls.

UNIT II PROCESS MANAGEMENT AND THREADING 9

Processes: Process concept – Process scheduling – Operation on Processes - Inter-process Communication: Shared Memory Systems - Message Passing Systems.

Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms: First-Come, First-Served – Priority – Round-Robin – Multilevel Queue – Multilevel Feedback Queue.

Threads: Overview – Multithreading models - Threading issues.

UNIT III PROCESS SYNCHRONIZATION AND DEADLOCKS 9

Process Synchronization: Background - The critical-section problem (Software based solution and hardware based solution) – Semaphores – Classic Problems of Synchronization – Monitors.

Deadlocks: System model - Deadlock Characterization – Methods for Handling Deadlocks -Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlocks.

UNIT IV MEMORY MANAGEMENT 9

Memory Management Strategies: Background – Swapping – Memory allocation: Contiguous Memory Allocation – Non-contiguous Memory Allocation: Segmentation - Paging – Segmentation with Paging - Structure of the Page Table.

Virtual Memory: Background - Demand Paging – Page Replacement – Allocation of Frames – Thrashing.

UNIT V FILE SYSTEM AND STORAGE MANGEMENT 9

File System Interface: File Concept – Access Methods – Directory and Disk Structure – Protection.

File System Implementation: File System Structure – File System Implementation – Directory Implementation - Allocation Methods – Free Space Management.

Mass Storage Structure: Overview of Mass Storage Structure – Disk Structure - Disk Scheduling – Disk Management - Swap Space Management.

Lecture: 45 hours Practical: 30 hours Total: 75 hours

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Ninth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2015.

REFERENCES

1. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 3rd edition 2007.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd edition 2009.
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 6th edition, 2009.
4. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Tata Mc-graw Hill Publishing, 3rd edition, 2012.
5. Charles Crowley, "Operating System: A Design-Oriented Approach", Tata Mc-graw Hill Publishing, 1st edition, 2009.

List of Experiments

1. Basic process management algorithms.
2. Implementing various memory allocation methods.
3. Implementing various page replacement policies.
4. Implementation of disk scheduling algorithms.
5. Explore programming performance in Linux and Windows.

COURSE OUTCOMES

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

1. Define algorithm and describe its characteristics.
2. Represent the algorithmic time complexity for recursive and non-recursive algorithms using different asymptotic notations.
3. Apply the algorithmic techniques - Brute Force, Divide and conquer, Decrease and Conquer to different problems and analyze the time complexity.
4. Apply the algorithmic techniques - Transform and conquer, Dynamic Programming and Greedy approach to solve different problems and analyze the time complexity.
5. Explain the algorithm design methods such as backtracking, branch and bound to solve complex problems and characterize the type of problems as NP, NP-Complete and NP-Hard.

UNIT I BASIC CONCEPTS OF ALGORITHMS 8

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT II MATHEMATICAL BACKGROUND AND ANALYSIS OF ALGORITHMS 8

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT III ANALYSIS OF SORTING AND SEARCHING ALGORITHMS 10

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree Traversal and Related Properties – Decrease and Conquer – Depth first Search and Breadth First Search – Algorithm for generating combinatorial objects.

UNIT IV ALGORITHMIC TECHNIQUES 10

Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort – Dynamic Programming – Warshall’s and Floyd’s Algorithm – Optimal Binary Search trees – Greedy Techniques – Approximate bin packing algorithm – Kruskal’s Algorithm – Dijkstra’s Algorithm – Huffman trees.

UNIT V ALGORITHM DESIGN METHODS 9

Backtracking – n-Queen’s Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – P, NP and NP complete problems – Introduction to approximate algorithms- Approximation algorithms for NP- hard problems -Travelling salesman problem and Knapsack problem.

Lecture: 45 hours Practical: 30 hours Total: 75 hours

TEXT BOOK

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, Third edition, 2011.

REFERENCES

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “Introduction to Algorithms”, PHI Pvt. Ltd., 2001
2. Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, Pearson Education Asia, 2003.
3. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
4. Horowitz and Sahni, “Fundamentals of Computer Algorithms”, Galgotia publications.

COURSE OUTCOMES

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

1. Identify the scope and requirements of software engineering in IT industry and apply different SDLC models in different applications.
2. Prepare Software Requirements Specification (SRS) document for real time applications.
3. Explain the object-oriented methodologies and workflows and apply object-oriented principles, techniques, appropriate UML models, and other artifacts to construct a design for a real-world problem.
4. Analyze and design system requirements using UML model to determine the use cases and identifying classes and their relationships.
5. Describe the different kind of software testing, System Usability Testing, User Satisfaction Testing.

UNIT I SOFTWARE PRODUCT AND PROCESS 9

Introduction: The Nature of Software, Software Process, Process Models - A Generic Process Model, Prescriptive Process Models: The Waterfall Model, Incremental Model, Evolutionary Process Models, Concurrent Model, Agile Development- Agile process, Scrum.

UNIT II SOFTWARE REQUIREMENTS AND ANALYSIS 9

Software Requirements: Functional and Non-Functional requirements, Requirements Engineering: Requirement Engineering Process -Establishing the Groundwork, Eliciting requirements, Negotiating requirements, Validating requirements. Feasibility Studies, Software Requirement Specification (SRS) Document.

UNIT III METHODOLOGY, MODELING, AND UNIFIED MODELING LANGUAGE 9

Object Oriented Systems Development Life Cycle - Object Oriented Methodologies: Rumbaugh Methodology, Booch Methodology, Jacobson Methodology and Unified Approach.

Unified Modeling Language: UML diagrams: Use case diagram, Activity Diagram, Class diagram, Sequence and collaboration diagram, Component Diagram, Deployment diagram.

UNIT IV OBJECT ORIENTED ANALYSIS AND DESIGN 9

Object Oriented Analysis: Identifying use cases, Classification, Identifying Object relationships. Software Design: Modular Design, Architectural Design, User Interface Design. Object Oriented Design: Axioms, Corollaries, Designing Classes.

UNIT V SOFTWARE QUALITY AND USABILITY TESTING 9

Introduction, Software Quality Assurance Testing, Testing strategies: Black Box Testing, White Box Testing, Top-Down Testing, Bottom-Up Testing. Test cases, Test Plan, Continuous Testing, Myer's Debugging Principles, System Usability Testing, User Satisfaction Testing.

Total: 45 Hours

TEXT BOOKS

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach", 7th Edition, McGraw-Hill International Edition, 2015.
2. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 2008.

REFERENCES

1. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2010.
2. Watts S.Humphrey, "A Discipline for Software Engineering", Pearson Education, 2007.
3. Martin Fowler, "UML Distilled", Second Edition, PHI/Pearson Education, 2002.
4. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.

COURSE OUTCOMES

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

1. Apply basic features of Java to write programs.
2. Apply inheritance, package, interface and exceptions to write efficient programs.
3. Apply collection framework for writing efficient programs for real time applications.
4. Write GUI based data driven application using JDBC.
5. Apply thread, generics and functional programming techniques for higher order programming.

UNIT I CLASS, METHODS AND STRINGS 9

History and Evolution of Java - An Overview of Java – Data types, variables, and Arrays- Operators – Control Statement – Introducing Class - Methods – String, StringBuffer, StringBuilder,

UNIT II INHERITANCE, PACKAGE, INTERFACE AND EXCEPTION HANDLING 9

Inheritance, Packages and Interfaces - Exception Handling Fundamentals – Exception Types – Uncaught Exception – Using try and catch – Multiple catch Clauses – Nested try statement – throw – throws – finally – Built-in Exception- Creating our own Exception class – Chained Exception-

UNIT III I/O AND THE COLLECTIONS FRAMEWORK 9

I/O Basics – Exploring java.io: Stream Class, Character Streams – Serialization - The Collections Framework – The ArrayList class – The HashSet class – Working with maps – The Vector class - Accessing a Collection via an Iterator.

UNIT IV GUI AND DATABASE CONNECTIVITY 9

Introducing Swing – Exploring Swing: JLabel, ImageIcon, JTextField, JButton, JList, JComboBox and JTable - Event Handling – JDBC Programming concept – Executing Queries – Scrollable and Updatable Resultset.

UNIT V THREADS, GENERICS AND FUNCTIONAL PROGRAMMING 9

Threads - Interrupting Threads - Thread States - Thread Properties – Synchronization -Auto Boxing – Generics – Lambda Expressions - Functions as First Class Objects -Pure Functions -Higher Order Functions

Total: 45 Hours

TEXT BOOK:

1. Herbert Schildt, “Java™ : The Complete Reference”, 9th edition, Oracle Press, 2014.
2. Anita Seth, B. L. Juneja, “JAVA: One Step Ahead”, Oxford University Press, 2017.

REFERENCES:

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, 9th edition, Prentice Hall, 2013.
2. K. Arnold, D. Holmes and J. Gosling, “The JAVA programming language”, 4th edition, Addison Wesley Professional, 2005.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, 3rd edition, Addison Wesley, 2000.
4. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, 5th edition, Tata McGraw-Hill Publishing company Ltd., 2009.

COURSE OUTCOMES

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

1. Apply the basic features of JAVA such as Control statements, Arrays, Classes, Inheritance, Interface and Packages in solving a problem
2. Apply appropriate IO stream, Functional programming, generics and collection framework for solving real time problems
3. Write multithreaded GUI based data driven application using JDBC concepts

LIST OF EXPERIMENTS

1. Write the programs using the concept of nested loops, recursion, arrays, String and StringBuffer class.
2. Write the programs using the concept of Class, Inheritance, Interface and Packages
3. Write a program that uses the I/O package for reading and writing a text file.
4. Write a program that uses the different exception handling mechanism.
5. Write a program that persistently stores the current state of the object.
6. Write a program that uses generic concept for writing efficient program.
7. Write a program that uses different collection class for managing data of different applications.
8. Write the programs that uses the concept of Threads.
9. Implementing a GUI based on Swings and Frames. Also, write the program to handle GUI based events.
10. Write a program that uses JDBC API for interacting with the database.
11. Implement java programs with Lambda Expressions and Functional Programming.

Total: 30 hours

COURSE OUTCOMES

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

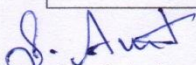
1. Write ALP programs for arithmetic manipulations using Microprocessors.
2. Interface different I/Os with microprocessors and perform arithmetic manipulations using Microcontroller.
3. Solve real time industry based problems with Microprocessors and Microcontrollers.

LIST OF EXPERIMENTS

1. 8-bit and 16 bit Manipulations- Addition, Subtraction, Multiplication and Division using Microprocessors.
2. Code conversions - BCD to Binary and Binary to BCD using Microprocessors.
3. Decimal Arithmetic and Bit Manipulation using Microprocessors.
4. Double precision – Addition and subtraction using Microprocessors.
5. 8255 Interface -Experiments with mode 0 and mode1 using Microprocessors.
6. 8279 Interface -Keyboard/ Display Interface with Microprocessors.
7. 8253 Interface -Timer Interface with Microprocessors.
8. 8251 Interface -Programmable Communication Interface with Microprocessors.
9. 8-bit and 16 bit Manipulations- Addition, Subtraction and Multiplication using 8051.
10. Array Operations-Sum of N Elements using 8051.
11. Applications – Traffic light controller and stepper motor using Microprocessors and Microcontroller.

Total: 30 hours

| Semester – IV | U15 GE 401R: SOFT SKILLS AND APTITUDE – II | L | T | P | C | Marks |
|---|---|---|---|---|---|-------|
| | | 0 | 0 | 2 | 1 | 100 |
| Course Outcomes | | | | | | |
| At the end of the course the student will be able to: | | | | | | |
| 1. Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches | | | | | | |
| 2. Solve problems of increasing difficulty than those in SSA-I* in given areas of quantitative aptitude and logical reasoning and score 65-70% marks in company-specific internal tests | | | | | | |
| 3. Demonstrate greater than SSA-I level of verbal aptitude skills in English with regard to given topics and score 65-70% marks in company-specific internal tests | | | | | | |
| 1. Soft Skills | Demonstrating soft-skill capabilities with reference to the following topics: <ol style="list-style-type: none"> SWOT Goal setting Time management Stress management Interpersonal skills and Intrapersonal skills Presentation skills Group discussions | | | | | |
| 2. Quantitative Aptitude and Logical Reasoning | Solving problems with reference to the following topics: <ol style="list-style-type: none"> Allegation and mixture Time, speed and distance: Unit conversion, Average speed, Relative speed, two objects crossing each other in the same direction and opposite direction, Boats and streams, Races and games Clocks Calendars Blood relations Cubes and Dices Syllogism (≤ 3 statements) Ranking and order Company specific aptitude questions | | | | | |
| 3. Verbal Aptitude | Demonstrating English language skills with reference to the following topics: <ol style="list-style-type: none"> Critical reasoning Theme detection Verbal analogy Prepositions Articles Cloze test Company specific aptitude questions | | | | | |


Dr.S.Anita

Department of Placement Training
Sena College of Technology,
Salem-636 005.

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester V under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------|--|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15IT501R | Computer Networks | 3 | 0 | 0 | 3 |
| 2 | U15IT502R | Database Management Systems | 3 | 0 | 0 | 3 |
| 3 | U15IT503R | Theory of Computation | 3 | 2 | 0 | 4 |
| 4 | U15IT504R | Web Technology | 3 | 0 | 0 | 3 |
| 5 | U15IT904R | Elective - Computer Graphics | 2 | 0 | 2 | 3 |
| | U15IT905R | Elective - C# .Net | | | | |
| Practical | | | | | | |
| 6 | U15IT505R | Computer Networks Laboratory | 0 | 0 | 2 | 1 |
| 7 | U15IT506R | Database Management Systems Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15IT507R | Web Technology Laboratory | 0 | 0 | 4 | 2 |
| 9 | U15IT508R | Mini Project - I | 0 | 0 | 2 | 1 |
| 10 | U15GE501R | Soft Skills and Aptitude - III | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 23 |

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/Information Technology, Fifth Semester B.Tech IT Students and Staff, COE

COURSE OUTCOMES

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

1. Describe the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. Analyze the link layer concepts of error-detection and correction techniques, multiple access protocols, point-to-point protocols and characteristics of link layer media (including wireless links).
3. Explain the transport layer concepts and protocol design including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.
4. Apply subnetting and supernetting concepts to maintain networks and explain the network layer concepts and protocol design including datagram forwarding, routing algorithms, and network interconnections.
5. Explain the basic concepts of application layer protocol design including client/server models, peer-to-peer models, and network naming.

UNIT I INTRODUCTION 9

Data Communications Networks, Network Types- Standards and administration- OSI Model- TCP/IP Protocol Suite.

Physical layer: Performance - Transmission Media: Guided and Unguided media –Switching: Circuit switched networks and Packet Switched Networks.

UNIT II DATA LINK LAYER 9

Introduction – Link Layer addressing - Error Detection: Types of Errors, Redundancy, Cyclic Codes - Cyclic Redundancy Check- Check Sum.

DLC Services – Data Link Layer Protocols, Media Access Control – Random Access, Controlled Access - Ethernet protocol – Standard Ethernet.

UNIT III NETWORK LAYER 9

Services, Packet Switching – Internet Protocol-Routing Algorithms - Unicast Routing Protocols - IPv6 Protocol.

UNIT IV TRANSPORT LAYER 9

Introduction - User Datagram Protocol (UDP) - User Datagram, UDP Services, UDP applications Transmission Control Protocol (TCP) - Services-Features-segment - TCP connection - Windows in TCP - Flow Control - Error Control - TCP Congestion Control.

UNIT V APPLICATION LAYER 9

Application Layer – WWW and Http, FTP – Two connections, Control connection, Data connection, security of FTP – Electronic Mail – Architecture, web based mail – Email security.

Total: 45 hours

TEXT BOOK

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 5th Edition 2016.

REFERENCES

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2011.
2. Larry L. Peterson and Peter S. Davie, “Computer Networks: A Systems Approach”, Harcourt Asia Pvt. Ltd., 2nd edition, 2009.
3. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall PTR, 4th Edition, 2012
4. Halsall, Fred, “Computer Networking and Internet”, Pearson Education, 5th edition, 2011.

COURSE OUTCOMES

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

1. Comprehend the need, background, architecture and evolution of database management system and design ER diagram for database design
2. State the characteristics of relational model with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS and write queries to retrieve and manipulate databases
3. Design and evaluate the normality of a logical data model, and correct any anomalies
4. Explain the general idea of data storage, indexing techniques and query processing
5. Summarize the transaction management and recovery management techniques adopted in database management system

UNIT I INTRODUCTION**9**

Database and Database Users: Characteristics of database approach, Advantages of DBMS Approach, Database Applications.

Database system concepts and architecture: Data models, Schemas, Instance, Three schema architecture and data independence, DBMS languages, DBMS interfaces, database system Environment, ER model, EER data model.

UNIT II RELATIONAL MODEL**9**

Relational data model, relational constraints and relational Algebra: Relational model concepts, Relational constraints and Relational data base schema, update operations, basic Relational algebra operations, additional relational operations.

SQL: Data definition and constraints, Basic queries, insert, delete, update, complex queries, views, assertions and triggers, embedded SQL, dynamic SQL.

Database security and Authorization: security issues, grant/revoke privileges, SQL injections.

UNIT III RELATIONAL DATABASE DESIGN**9**

Functional dependencies and normalization: Functional dependencies, Normal forms: 1NF, 2NF, 3NF, Boyce Codd NF, decomposition, multivalued dependencies and 4NF, join dependencies and 5NF.

UNIT IV DATA STORAGE AND QUERY PROCESSING**9**

Disk Storage, Basic File Structures, and Hashing: Secondary Storage Devices, RAID, Operations on Files, Heap Files, Sorted Files, Hashing Techniques.

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees.

Query Processing: Translating SQL Queries into Relational Algebra, Algorithms for External Sorting, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and Set Operations.

UNIT V TRANSACTION MANAGEMENT

9

Transaction Processing: Introduction, Transaction and System Concepts, desirable Properties of Transactions, Schedules based on Recoverability, Schedules based on Serializability.

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Timestamp Ordering.

Database Recovery Techniques: Recovery Concepts, Deferred Update, Immediate Update, Shadow Paging, ARIES recovery algorithm.

Total: 45 hours

TEXT BOOK

1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems ", 6th Edition, Addison-Wesley, 2014

REFERENCES

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, "Database System Concepts", 6th Edition, McGraw-Hill, 2016
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003
3. Date. C. J, Kannan. A, Swamynathan. S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2012
4. Rajesh Narang, "Database Management systems", PHI Learning pvt. Ltd, New Delhi,2011.

COURSE OUTCOMES

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

1. Prove results using proof by induction, contradiction and understand formal definitions of automata, languages and Grammars.
2. Apply the models of Finite automata and explain the properties of languages with applications.
3. Explore the models of Pushdown automata, context free languages and describe the different forms of context free grammars.
4. Classify the different representations, techniques, extensions and simulating a Turing machine by Computer.
5. Describe concrete examples of computationally undecidable or inherently infeasible problems from different fields.

UNIT I AUTOMATA THEORY**15**

Finite Automata: Constructing Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA) Equivalence of DFA and NFA: Finite Automata with Epsilon Transitions, Finite Automata without Epsilon Transitions, Subset Construction Method, Minimizing Automata - Applications of Finite Automata

UNIT II REGULAR EXPRESSIONS AND CONTEXT FREE GRAMMARS**15**

Regular Expressions and Properties: Constructing Regular Expressions, Finite Automata and Regular Expressions - Conversion of RE to Automata and Automata to RE, Applications of Regular Expressions, Pumping Lemma, Closure Properties.

Context Free Grammars: Definitions and Derivations, Parse trees, Applications, Ambiguity in Grammars and Languages.

UNIT III PUSHDOWN AUTOMATA AND CONTEXT FREE LANGUAGES**15**

Pushdown Automata: Definition, The Languages of a PDA, Constructing PDA's, Equivalence of PDA and CFG, Deterministic Pushdown Automata

Normal Forms and Properties: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma and Closure Properties of CFL.

UNIT IV TURING MACHINE AND RECURSIVE ENUMERABLE LANGUAGE**15**

Introduction: Definition, Constructing Simple TM's, Representations, Programming Techniques – Automata with storage, Multi-tape tracks, Checking of symbols, Subroutines, Universal Turing Machine, Turing Machines and Computers

UNIT – V UNDECIDABILITY AND COMPLEXITY**15**

Undecidability: Language that is not Recursively Enumerable, Undecidable Problem that is Recursive Enumerable, Undecidable Problem about Turing Machine, Post Correspondence Problem, Modified PCP

P and NP: The Class P, The class NP, The NP-Complete Problem

Tutorials: 30 hours Total: 75 hours

TEXT BOOKS

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman “Introduction to Automata Theory, Languages, and Computation “, 3rd Edition, Pearson Education, 2008

REFERENCES

1. Kavi Mahesh “Theory of Computation – A Problem-Solving Approach”, John Wiley-India, First Edition, 2012
2. A.M. Natarajan, A. Tamilarasi, P. Balasubramani “Theory of Computation “, New Age International Publishers, 2007
3. Raymond Greenlaw, H. James Hoover “Fundamentals of the Theory of Computation: Principles and Practice”, Morgan Kaufmann Publishers, 1998
4. John C. Martin “Introduction to Languages and the Theory of Computation”, 4th Edition, McGraw-Hill, 2010

COURSE OUTCOMES

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

1. Design a web page for any application using HTML5 and CSS3
2. Create an interactive and semantic web page using Java scripts and XML.
3. Write server side programs using the Servlets and JSP
4. Write server side programs using open source technologies such as PHP and MySQL
5. Apply AJAX , JSON and Node.js in the web application development

UNIT I INTRODUCTION TO INTERNET, HTML 5 and CSS 3**9**

History of Internet, WWW- HTML Common tags- List, Tables, images, forms, Frames- HTML 5:New Elements, Graphics, Media and APIs CSS2 and CSS3: Selectors ,Box Model, Backgrounds, Image Values and Replaced Content, Text Effects, 2D and 3D Transformations, Animations and Multiple Column Layout

UNIT II JAVASCRIPT AND XML**9**

Java Script control structures, Dynamic HTML- Javascript document object model - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object - Screen object - User defined object – Cookies – XML Introduction- XML DTD, XML Schema, XML-CSS-XSLT

UNIT III WEB SERVERS, SERVLETS AND JSP**9**

Tomcat web server - Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, Handling Http Request & Responses.

JSP - The Problem with Servlet - The Anatomy of a JSP Page, JSP Processing – JSP scripting elements – Implicit objects – Directive elements.

UNIT IV PHP AND MYSQL**9**

PHP: Introduction,syntax,variables,strings,operators,if-else,loop,switch,array,function,form, mail, fileupload, session, filters, PHP-ODBC.

MySQL: Introduction– Setting up account– Starting, terminating and writing your own SQLprograms - PHP and SQLdatabase – PHP Connectivity.

UNIT V ASYNCHRONOUS SCRIPTING**9**

AJAX Concepts – AJAX request from JavaScript and JQuery- Processing JSON with jQuery and Javascript – Node.Js: Introduction, Environment Setup, Package Manager, Callbacks Concept, Event Loop, Emitter, Buffers, Streams, File System and Web Module

Total: 45 hours**TEXT BOOKS**

1. Internet and World Wide Web – How to program by Paul J. Deitel , Harvey M.Deitel, 5th Edition, PHI/Pearson Education Asia, 2012.
2. N P Gopalan, J Akilandeswari, “ Web Technology – A developers Perspective”, PHI Learning Pvt. Ltd., New Delhi, 2014.
3. Ullman,“PHP fortheWeb:VisualQuickStartGuide”, 5th Edition, PearsonEducation, 2016.
4. Brad Dayley, “Node.js, MongoDB, and AngularJS Web Development”, Addison-Wesley, 2014 .

5. Rebecca.M.Riordan, "Head First Ajax :A Brain-Friendly Guide", O'Reilly Media, 2009.

REFERENCE

1. James Conard, Patrick Dengler, Brain Franics Et Al, "Introducing .NET ", Shroff Publishers, New Delhi, 2001.
2. Hortsman & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", 8th Edition, Pearson Education, 2008.
3. Heather Williamson, "XML: The Complete Reference", 1st Edition. McGraw-Hill, 2001.

COURSE OUTCOMES

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

1. Identify Network Devices and configure and test network
2. Write programs for UDP, TCP and other protocols using Socket Programming and network simulator
3. Implement flow control protocols

LIST OF EXPERIMENTS

1. Study of Network devices in detail.
2. Study of Network IP.
3. Configuration of networks in Linux using ipconfig, route, bind, etc.
4. Configuration of firewall and masquerading in Linux; network trouble-shooting and performance monitoring using netstat, ping, tcpdump, etc.
5. Study of TCP/UDP socket programming
6. Implementation of UDP
7. Implementation of TCP
8. Implementation of stop and wait protocol
9. Implementation of sliding window protocol
10. Implementation of shortest path algorithm
11. Implementation of Chat application
12. Implementation of File transfer

Note: Two or three experiments numbered from 6 to 12 can be implemented using network simulator.

Total: 30 hours

COURSE OUTCOMES

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

1. Build tables, construct relationships among them and retrieve data with simple and complex queries
2. Build various constraints, triggers and indexes on the tables
3. Design and implement a database and to integrate into a simple application

LIST OF EXPERIMENTS

1. Create a relational database system using DDL commands with constraints.
2. Update the database system using DML commands.
3. Query the database using simple and complex queries.
4. Create and update views.
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Create triggers.
7. Create assertions and indexes.
8. Use of front end tools to manipulate the database.
9. Generate reports using a reporting tool.
10. Database Design and implementation of an application system. (Suggested Mini Project)

Total: 60 hours

COURSE OUTCOMES

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

1. Develop web applications using HTML5, CSS3 and Java Scripts.
2. Develop a server-side application to generate dynamic web pages using Servlet, JSP and PHP technologies
3. Develop an interactive and rich GUI based web applications using AJAX and node.js.

EXPERIMENTS

1. Web page creation using HTML and DHTML and Client side Scripting Languages
2. Design a web page using CSS (Cascading Style Sheets)
3. Write JavaScript to validate the fields in a conference registration page.
4. Write a GUI program for getting time and data information from the server.
5. Design a JSP program to store and retrieve the data in pure XML format from database.
6. Write a JSP program for order processing
7. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
8. Write a Servlet, bean program to access information from databases
9. Create a Web page by using PHP and My SQL for Email Service.
10. Develop a AJAX based web application that interacts with database and retrieve JSON document for the processing.
11. Develop a Node.js based web application
12. Develop a web application in IBM Bluemix cloud that offers PaaS.

Total: 60 hours

COURSE OUTCOMES

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

1. Draw the basic output primitives and perform different 2D transforming and clipping.
2. Explain 3D object representation and perform 3D object transformation and visible surface identification.
3. Explain the concepts of Animation and create different basic primitives using OpenGL
4. Comprehend and apply different methods of shading, creating shaded objects, Rendering texture and Drawing Shadows
5. Implement various Fractals using different techniques and will be able to perform Ray Tracing.

UNIT I BASIC PRIMITIVES 7

Output Primitives: Line, Circle and Ellipse drawing algorithms and Attributes of output primitives.

UNIT II 2D CONCEPTS 7

Transformation: Translation, Rotation and Scaling.

Viewing: Line, Polygon, Curve and Text clipping algorithms.

UNIT III 3D DISPLAY METHODS 5

Three dimensional display methods: Parallel projection, Perspective projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering and Exploded and Cutaway Views.

UNIT IV 3D OBJECT REPRESENTATION 5

Three dimensional object representation: Polygons, Curved lines, Splines, Quadric Surfaces, Visualization of data sets.

Color Models: RGB, YIQ, CMY, HSV.

UNIT V ANIMATION AND GRAPHICS PROGRAMMING 6

Animations: General Computer Animation, Raster, Key frame

Graphics programming using OPENGL: Basic graphics primitives, drawing three dimensional objects, drawing three dimensional scenes.

Total: 60 hours

TEXT BOOK

1. Donald Hearn, Pauline Baker, "Computer Graphics – C Version", Second Edition, Pearson Education, 2004.
2. F.S. Hill, "Computer Graphics using OPENGL", Second Edition, Pearson Education, 2003.

REFERENCES

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, "Computer Graphics-Principles and practice", Second Edition in C, Pearson Education, 2007.
2. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008.
3. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010.

LIST OF LAB EXERCISES

1. Study of basics of OpenGL.
2. To implement Bresenham's algorithms for line, circle and ellipse drawing
3. To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing.
4. To implement Cohen-Sutherland 2D clipping and window-viewport mapping
5. To perform 3D Transformations such as translation, rotation and scaling.
6. Write a OpenGL program to construct a hut

COURSE OUTCOMES

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

1. Explain basic concepts of C#.Net
2. Write applications using OOPs concepts in C# with exception handling
3. Implement database connectivity applications using ADO.Net
4. Apply and use data binding controls and BLOB objects
5. Explain .Net framework and LINQ programming

UNIT I BASICS OF C#**6**

Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data types – Operators – Expressions – Branching – Looping – Methods – Arrays – Strings – Structures – Enumerations.

UNIT II OBJECT ORIENTED CONCEPTS IN C#**6**

Classes – Objects – Inheritance – Polymorphism – Interfaces – Operator Overloading – Delegates – Events – Errors and exceptions.

UNIT III APPLICATION DEVELOPMENT ON .NET**6**

Building windows applications – Windows form controls - Common Dialog Boxes - Creating user controls - ADO.NET Architecture – ADO.NET Components and Classes – ADO.NET Connected and Disconnected Models.

UNIT IV DATA BINDING AND THREADS**6**

XML and ADO.NET – Simple and Complex Data Binding – Data Grid View Class - Storage and retrieval of BLOB objects - Threads.

UNIT V .NET FRAMEWORK AND LINQ**6**

Assemblies – Versioning – Attributes – Reflection – Marshalling – Remoting – Introduction to LINQ.

Total: 60 hours**TEXT BOOKS**

1. Balagurusamy, E., “Programming in C#”, 3rd Edition, McGraw- Hill, 2010.
2. Liberty, J., “Programming C# 6.0”, O’Reilly, 2015.

REFERENCES

1. Herbert Schildt, “The Complete Reference –C#”, Tata McGraw- Hill, 2004.
2. Robinson, “Professional C#”, 2nd Edition, Wrox Press, 2002.
3. Thamarai Selvi, S. and Murugesan, R., “A Textbook on C#”, Pearson Education, 2003.
4. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 2003.
5. Paul J. Deitel and Harvey M.Deitel, C# 2008 for Programmers, 3rd Edition, Pearson Education.

Lab Exercises:

1. Arrays and strings
2. Inheritance
3. Windows form creation
4. Delegates and Events
5. Creating user controls
6. Multi module assembly
7. Database creation using ADO.NET
8. LINQ Programming

| Semester –V | U15 GE 501R:SOFT SKILLS AND APTITUDE - III | L | T | P | C | Marks |
|---|---|---|---|---|---|-------|
| | | 0 | 0 | 2 | 1 | 100 |
| Course Outcomes | | | | | | |
| At the end of the course the student will be able to: | | | | | | |
| 1. Demonstrate capabilities in supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches | | | | | | |
| 2. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests | | | | | | |
| 3. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests | | | | | | |
| 1.Soft Skills | Demonstrating soft-skill capabilities with reference to the following topics: <ol style="list-style-type: none"> Career planning Resume writing Group discussion Teamwork Leadership skills Interview skills Mock interview Mock GDs | | | | | |
| 2.Quantitative Aptitude and Logical Reasoning Topics | Solving problems with reference to the following topics : <ol style="list-style-type: none"> Numbers: Remainder concept Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule Simple interest Compound interest Set theory: Venn diagram Puzzles Mathematical operators Syllogism (≥ 4 Statements) Data sufficiency Statement and assumptions Statement and conclusions Company specific aptitude questions | | | | | |
| 3. Verbal Aptitude | Demonstrating English language skills with reference to the following topics: <ol style="list-style-type: none"> Subject verb agreement Selecting the best alternative for the stated parts of given sentences Reading comprehension Contextual synonyms Sentence fillers Writing a story for a given picture Company specific aptitude questions | | | | | |

S. Ant

Department of Placement Training

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VI under Regulations 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|----------------------|-------------------|--|---------|----------|-----------|-----------|
| Theory | | | | | | |
| 1 | U15IT601R | Data Mining | 3 | 0 | 0 | 3 |
| 2 | U15IT602R | Principles of Compiler Design | 3 | 0 | 0 | 3 |
| 3 | noc21-cs17 | Professional Elective - Introduction to internet of things (NPTEL) | 3 | 0 | 0 | 3 |
| 4 | U15IT917R | Elective - Cloud Computing | 3 | 0 | 0 | 3 |
| | U15IT918R | Information Security | | | | |
| | U15IT922R | Machine Learning | | | | |
| 5 | U15CE1003R | Open Elective - Energy Efficiency and Green Building | 3 | 0 | 0 | 3 |
| | U15EC1006R | Sensors and Smart Structures Technologies | | | | |
| | U15EE1001R | Electric Mobility | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | |
| | U15EE1007R | Innovation IPR and Entrepreneurship Development | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | |
| U15ME1004R | Industrial Safety | | | | | |
| Practical | | | | | | |
| 6 | U15IT603R | Python Programming Laboratory | 1 | 0 | 4 | 3 |
| 7 | U15IT604R | Software Design and Testing Laboratory | 1 | 0 | 4 | 3 |
| 8 | U15IT605R | Internet of Things Laboratory | 1 | 0 | 2 | 2 |
| 9 | U15IT606R | Mini Project - II | 0 | 0 | 2 | 1 |
| 10 | U15GE601BR | Soft Skills and Aptitude - IV | 0 | 0 | 2 | 1 |
| Total Credits | | | | | | 25 |

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/Information Technology, Sixth Semester B.Tech IT Students and Staff, COE

COURSE OUTCOMES

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

1. Apply the concepts of building a data warehouse and explore the various methods for implementing data warehouse
2. Explain the fundamental processes, concepts and techniques of data mining
3. Explain the concepts of association rule mining and classification and apply appropriate algorithm for the given data
4. Apply clustering algorithms to data sets
5. Investigate the different applications and trends of data mining.

UNIT I DATA WAREHOUSING 9

Data warehouse Overview: What is a data warehouse, A Multidimensional Model, Architecture, implementation, from data warehouse to data mining.

Data cube technology: OLAP technology, attribute oriented induction.

UNIT II INTRODUCTION TO DATA MINING 9

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

Data Preprocessing: Need to preprocess, data cleaning, data integration, data reduction, data transformation and discretization, concept hierarchy generation.

UNIT III ASSOCIATION RULE MINING AND CLASSIFICATION 10

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

UNIT IV CLUSTERING 9

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods.

UNIT V APPLICATIONS AND TRENDS IN DATA MINING 8

Mining complex data types, other methodologies, Data Mining Applications, Social Impacts of data mining, Trends in data mining,

Total: 45 hours

TEXT BOOK

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Morgan Kaufmann, 2016.

REFERENCES

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata Mc Graw Hill Edition, Tenth Reprint 2007.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction To Data Mining”, Pearson Education, 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay “, Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
5. Soumendra Mohanty, “Data Warehousing Design, Development and Best Practices”, Tata McGraw Hill Edition, 2006.

COURSE OUTCOMES

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

1. Describe the phases of compilation process, purpose and implementation approach of each phase
2. Build NFA and DFA using the formalisms and techniques including regular expressions, and LEX tool
3. Explain the concepts of context free grammar, different parsing techniques and YACC tool
4. Apply semantic analysis of expressions and design code generation schemes
5. Implement various parsing, conversion, optimization and code generation algorithms for the design of a compiler

UNIT I INTRODUCTION TO COMPILERS 9

Introduction: Compilers, Analysis of the Source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Compiler-Construction Tools

UNIT II LEXICAL ANALYSIS 9

Lexical Analysis: Need and role of lexical analyzer, Lexical errors, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata, From a Regular Expression to an NFA

LEX: Design of a Lexical Analyzer Generator.

UNIT III SYNTAX ANALYSIS 9

Syntax Analysis: Need and role of the parser, Context Free Grammars

Top Down parsing: Introduction, Recursive Descent Parser, Predictive Parser, LL (1) Parser

Bottom-Up Parsing: Introduction, Shift Reduce Parser, LR Parser, LR (0) item, Construction of SLR Parsing table, Canonical LR Parsing, LALR Parser

YACC: Design of a syntax analyzer for a sample language.

UNIT IV SYNTAX DIRECTED TRANSLATION 9

Syntax directed translation: Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, Bottom-Up Evaluation of Inherited Attributes

Intermediate Code Generation: Forms of intermediate code, Translation of Assignment, Boolean Expression and Control statements, Back -Patching type systems

UNIT V CODE OPTIMIZATION AND CODE GENERATION 9

Code Optimization: Principal sources of Optimization, Directed Acyclic Graph, Optimization of basic blocks, Global data flow analysis, Efficient data flow algorithms

Code Generation: Issues in design of a code generator, simple code generator algorithm

TOTAL: 45 hours

TEXT BOOK

1. Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, "Compilers – Principles, Techniques and Tools", second edition, Pearson Education, New Delhi, 2006.

REFERENCES

1. Dhamdhare D M, "Compiler Construction Principles and Practice", second edition, Macmillan India Ltd., New Delhi, 2002.
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2001.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs and Koen G Langendoen, "Modern Compiler Design", John Wiley, New Delhi, 2000.
4. Raghavan V, "Principles of Compiler Design", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009.

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

INTENDED AUDIENCE: CSE, IT, ECE, EE, Instrumentation Engg, Industrial Engineering

PREREQUISITES : Basic programming knowledge

Course layout

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I

Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II

Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

Week 4: Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications

Week 5: Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi

Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing

Week 9: Cloud Computing(contd), Sensor-Cloud

Week 10: Fog Computing, Smart Cities and Smart Homes

Week 11: Connected Vehicles, Smart Grid, Industrial IoT

Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

BOOKS AND REFERENCES

1. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Research Papers

COURSE OUTCOMES

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

1. Develop python applications for real world problems.
2. Create applications using files and modules.
3. Develop applications using Django framework.

UNIT I INTRODUCTION TO PYTHON 5

Introduction: Features - Installing - Running, Syntax and Style: Variable Assignment - Memory Management, Python Objects: Standard Types, Numbers, Sequences: Strings - Lists - Tuples, Dictionaries

UNIT II PYTHON FILES AND MODULE 4

Conditions and Loops. Files and Input/Output: File Objects and Built in functions - Functions

UNIT III INTRODUCTION TO DJANGO 6

Overview - Django Basics - Templates and static media - Models and Databases.

REFERENCES

1. Wesley J. Chun, "Core Python Programming", Pearson, 2nd Edition, 2006.
2. Mark Lutz, "Learning Python", O'Reilly Media, 4th Edition, 2003.
3. Allen Downey, "Think Python: How to Think Like a Computer Scientist", Green tea Press, 2nd Edition.
4. Leif Azzopardi and David Maxwell, "Tango With Django: A beginner's Guide to Web Development With Python / Django", 2nd Edition, 2016.

LIST OF EXPERIMENTS

1. Develop programs to understand the control structures of python
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python
3. Develop programs to learn concept of functions scoping, recursion and list mutability.
4. Develop programs for data structure algorithms using python – searching, sorting and hash tables.
5. Develop programs using Python Module
6. Develop programs to read and Write a text file
7. Learn to plot different types of graphs using PyPlot.
8. Develop programs using Django templates and media
9. Develop programs using Django Models
10. Develop programs using Django Database

Total: 75 hours

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

1. Analyse the problem and gather requirements there by design UML diagrams.
2. Develop software for web applications.
3. Test the applications using automated testing tools.

UNIT I INTRODUCTION

4

Fundamentals of Software Testing –Testing Levels - Testing Types – Advantages of Test Automation in comparison to Manual Testing – Automation ROI - Automation Test Process

UNIT II TEST PYRAMID

4

The Test Pyramid - Concepts of unit testing – Test-driven development (TDD) - GUI tests – Behaviour-driven development (BDD) – Smoke tests and regression tests – Service or Integration tests – Unit / GUI / Service or integration tests in the process of continuous integration / delivery / deployment – Tools, Framework and libraries available in the market

UNIT III AUTOMATION TESTING AND SELENIUM

7

Selenium: Basic Concepts of Java and first Web driver program, web driver Interface explanation and Invoking Browser, Basic Methods of Web driver, How to run tests in Google Chrome, How to run tests in Internet Explorer, Locator Techniques & Tools used, Preview Browser Add-ons overview to identify elements, Preview Installing Firebug & Firepath Add-ons, Locator Techniques : Xpath identification using Firepath, Name ,ID, ClassName, LinkText,-Handling links- Using Chropath plugin similar as firepath for firefox, handling duplication of elements in the application.

Lecture Hours: 15 hours

EXPERIMENTS

Prepare the following documents for the projects listed below and develop the application using software engineering methodology.

1. Program Analysis and Project Planning - Thorough study of the problem – Identify project scope, Objectives, Infrastructure.
2. Software Requirement Analysis - Describe the individual Phases / Modules of the project, Identify deliverables.
3. Data Modeling - Use work products – Data dictionary, Use case diagrams and activity diagrams, build and test class diagrams, Sequence diagrams and add interface to class diagrams.
4. Software Development and Debugging
5. Software Testing and Debugging- Develop a test plan and test case -Perform unit, integration, system and acceptance testing on application software- Track bugs and defects- Use automated testing tools: LoadRunner, WinRunner, Selenium and Neoload test, Junit.

SUGGESTED LIST OF APPLICATIONS

1. GST calculator
2. Aadhar details verification system
3. Pizza Ordering Systems
4. Online Ticket Reservation System
5. Course Registration System
6. Expert System for medical issues
7. ATM Systems
8. Stock Maintenance
9. E-Mail Client System
10. Time table Generation System

Total: 75 hours

COURSE OUTCOMES

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

1. Interface various sensors with Arduino and Raspberry pi boards.
2. Implement the control applications using Arduino programming
3. Experiment the different IoT applications with Raspberry pi using Python Programming.

UNIT I SENSOR AND ACTUATORS

3

Sensors –sensor types: Light, temperature, Force and sound- Actuators-Actuator types

UNIT II OVERVIEW OF IOT

3

An example of IoT Implementation- IoT Service Oriented Architecture- IoT Categories- IoT and Associated Technologies- IoT challenges

UNIT III INTRODUCTION TO ARDUINO PROGRAMMING

3

Features of Arduino- Types of Arduino Board-Board Details-Arduino IDE Overview-Example programs

UNIT IV INTRODUCTION TO RASPBERRY PI

3

Raspberry Pi introduction - Basic Architecture -Raspberry Pi pin configuration –Basic set up for Raspberry Pi

UNIT V INTRODUCTION TO PYTHON PROGRAMMING

3

Python IDE- Data-types in Python- Functions in Python, Implementation of IoT with Raspberry Pi using Python

TEXT BOOK

1. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.

REFERENCES

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
2. Dr.K.V.K.K.Prasad, “Embedded Real Time Systems: Concepts, Design and Programming”, DreamTech Publication, 2003.
3. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012.
4. Introduction to IoT NPTEL video lectures by Dr. Sudip Misra, IIT Kharagpur 2017.

List of Experiments

1. Installation of Arduino IDE and Blink LED
2. Creating different LED Patterns using Loops and functions
3. Interfacing Arduino Nano with Joystick
4. Control the brightness of an LED by using PWM
5. Control servo motor using Joystick
6. Control LED, Buzzer and Relay from smart phone using Bluetooth Module.
7. Interface DHT 11 sensor with Arduino Nano and upload the humidity and temperature on the cloud.
8. Familiarization of Raspberry pi by blink LED program
9. Interface PIR sensor with Raspberry pi for motion detection.
10. Control the stepper motor using Raspberry pi based on specific input
11. Measure the humidity and temperature using DHT sensor and display the data readings on the LCD screen.
12. Build a secret code based security system using Raspberry pi

Total: 45 hours

COURSE OUTCOMES

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

1. Explain the architecture of Cloud computing paradigm
2. Comprehend the deployment models and services provided by cloud
3. Outline on technological drivers in cloud
4. Explain virtualization and identify the appropriate programming models in cloud for a specific application
5. Explain networking and security issues in cloud

UNIT I INTRODUCTION AND CLOUD COMPUTING ARCHITECTURE

9

Computing Paradigms- Cloud Computing Fundamentals- Motivation for Cloud Computing- Defining Cloud Computing- Principles of Cloud computing- Cloud Ecosystem- Requirements for Cloud Services- Cloud Application- Benefits and Drawbacks - Introduction- Cloud Architecture- Anatomy of the Cloud- Network Connectivity in Cloud Computing- Applications on the Cloud- Managing the Cloud- Migrating Application to Cloud

UNIT II CLOUD DEPLOYMENT AND SERVICE MODELS

9

Introduction- Private Cloud- Public Cloud- Community Cloud- Hybrid Cloud- Infrastructure as a Service- Platform as a Service- Software as a Service- Other Cloud Service Models.

UNIT III TECHNOLOGICAL DRIVERS FOR CLOUD COMPUTING

9

SOA and Cloud - Multicore Technology- Virtualization - Memory and Storage Technologies- Networking Technologies – Web 2.0 – Web 3.0 - Pervasive Computing- Power of Cloud Computing in Application Development- Cloud Application Development Platforms – cloud computing APIs.

UNIT IV VIRTUALIZATION AND PROGRAMMING MODELS FOR CLOUD COMPUTING

9

Virtualization Opportunities- Approaches to Virtualization- Hypervisors- Virtualization to cloud computing - Extended Programming Models for Cloud- Cloud Service Providers- EMC, Google, Amazon Web Services, Microsoft, IBM-Open Source Support for Cloud- Eucalyptus, Red Hat OpenShift Origin, Dropbox, CloudSim.

UNIT V NETWORKING, SECURITY AND ADVANCED CONCEPTS

9

Overview of data center environment – Networking issues – Transport layer issues – TCP enhancements – Security in cloud computing – Introduction – Security aspects – Platform related security – Audit and compliance – Advanced concepts in cloud computing.

Total: 45 hours

TEXT BOOK

1. K.Chandrasekaran, “Essentials of Cloud Computing”, CRC press, 2015
2. Barrie Sosinsky, “Cloud Computing Bible”, Wiley, 2011.

REFERENCE

1. Michael Miller, “Cloud Computing”, Pearson Education, New Delhi, 2009.

COURSE OUTCOMES

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

1. Explain the essential fundamentals of information security
2. Explain and apply the Laws and code of Ethics in Information Security
3. Evaluate vulnerability of an information system and establish a plan for risk management
4. Describe the access control mechanism used for user authentication and authorization
5. Maintain security infrastructure

UNIT I INTRODUCTION 9

An overview of Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II SECURITY INVESTIGATION 9

Need for Security - Business Needs, Threats, and Attacks. Legal, Ethical and Professional Issues - Law and Ethics in Information Security, International Laws and Legal Bodies, Ethics and Information Security.

UNIT III RISK MANAGEMENT AND SECURITY POLICY AND STANDARDS 9

Risk Management: Risk Identification, Risk Assessment, and Risk Control Strategies. Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model.

UNIT IV SECURITY TECHNOLOGY 9

Access Control, Firewalls, Protecting Remote Connections, Intrusion Detection and Prevention Systems, Scanning and Analysis Tools.

UNIT V IMPLEMENTING INFORMATION SECURITY AND SECURITY MAINTENANCE 9

Information Security Project Management, Technical and non-technical Aspects of Implementation, Security Management Maintenance Models, Digital Forensics.

Total: 45 hours

TEXT BOOK

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.

REFERENCES

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3, CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.
4. Charles P.Pfleeger, Shari Lawrence Pfleeger, "Security in computing", 4th Edition, Pearson Publication, 2012.

COURSE OUTCOMES

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

1. Explain the concepts of different types of learning and apply linear regression
2. Summarize the concepts of logistic regression and implement the same with python
3. Explain and apply the concepts of Neural networks and support vector machines
4. Evaluate the hypothesis based on factors like bias and variance
5. Explain the concepts of clustering, dimensionality reduction and anomaly detection.

UNIT I INTRODUCTION AND LINEAR REGRESSION

9

What is machine learning? – Supervised Learning – unsupervised learning – Linear Regression – cost function – gradient descent algorithm – normal equation – implementation - Gradient descent for multiple variables – feature scaling – learning rate – polynomial regression – normal equation – implementation

UNIT II LOGISTIC REGRESSION

9

Hypothesis representation – decision boundary – nonlinear decision boundaries – cost function – gradient descent – advanced optimizations – multi class classification problems – python implementation – Regularization - Problem of overfitting – cost function optimization for regularization – regularized linear regression – regularization with normal equation - regularized logistic regression – python implementation

UNIT III NEURAL NETWORKS AND SUPPORT VECTOR MACHINES

9

Overview and summary – neurons and brain – model representation – artificial neural networks representation – example – multiclass classification – cost function – back propagation algorithm – gradient checking – random initialization – implementation – Support vector machines – optimization objective – cost function – large margin intuition – decision boundary – kernels – adapting to nonlinear classifiers – implementation

UNIT IV ADVICE FOR APPLYING MACHINE LEARNING

9

Debugging a learning algorithm – evaluating a hypothesis – model selection and training, validation test sets – bias Vs variance – regularization and bias/variance – learning curves machine learning system design

UNIT V OTHER TOPICS

9

Unsupervised learning – k-means algorithm – optimization objective – choosing number of clusters - Dimensionality reduction – principle component analysis - Anomaly detection – algorithm – developing and evaluating the algorithm – anomaly detection Vs supervised algorithm -Case study – recommender system – collaborative filtering - Large scale machine learning – online learning – map reduce and parallelism.

Total: 45 hours

REFERENCES

1. Stanford's machine learning course presented by Professor Andrew Ng – online resource - <http://www.holehouse.org/mlclass/>
2. James, G., Witten, D., Hastie, T., Tibshirani, R, “An Introduction to Statistical Learning with Applications in R”, Springer, 2013.
3. Tom M. Mitchell, “Machine Learning”, 1st edition, McGraw Hill Education, 2017.
4. Ethem Alpaydin, “Introduction to Machine Learning”, The MIT Press, 2nd edition, 2013.
5. Christopher M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.
6. Sebastianraschka, “Python Machine Learning”, Packt Publishing Ltd., 2017.

| Semester –VI | U15 GE 601B R: SOFT SKILLS AND APTITUDE – IV (For all Department except Civil) | L | T | P | C | Marks |
|--|--|---|---|---|---|-------|
| | | 0 | 0 | 2 | 1 | 100 |
| Course Outcomes | | | | | | |
| At the end of the course the student will be able to: | | | | | | |
| 1. Demonstrate capabilities in job-oriented company selection processes using the hands-on approach | | | | | | |
| 2. Solve problems of any given level of complexity in all areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests | | | | | | |
| 3. Demonstrate advanced-level verbal aptitude skills in English and score 70-75% marks in company-specific internal tests | | | | | | |
| 1. Soft Skills | Demonstrating Soft -Skills capabilities with reference to the following topics: a. Mock group discussions b. Mock interviews c. Mock stress interviews | | | | | |
| 2. Quantitative Aptitude and Logical Reasoning | Solving problems with reference to the following topics: a. Crypto arithmetic problems b. Permutation & Combination c. Probability d. Clocks & Calendars e. Functions & polynomials f. Logarithm g. Geometry h. Puzzles i. Data interpretation j. Data Sufficiency k. Company specific aptitude questions (AMCAT & Co cubes) | | | | | |
| a. 3. Verbal Aptitude | Demonstrating English language skills with reference to the following topics: a. Writing captions for given pictures b. Reading comprehension c. Critical reasoning d. Theme detection e. Jumbled sentences f. Writing a story on given pictures g. Company specific aptitude questions | | | | | |

S. Anant

Department of Placement Training
Sona College of Technology,
Salem-636 005.

IT

U15IT1003R PROBLEM SOLVING TECHNIQUES USING JAVA PROGRAMMING 3 0 0 3

PREAMBLE

The students opting for this course will learn to code in Java and improve the programming and problem-solving skills. Through this course, the students will acquire appropriate skills to design algorithms as well as develop and debug programs. We are excited to offer a unique course structure, designed to support learners of different engineering departments and to fulfill their dreams of pursuing a career in an IT industry.

This course aims to satisfy the curiosity of the learners who wants to know how a ticket is booked in railways, or how an electricity consumption bill is generated. After the completion of the course, learners will be able to code real time problems in JAVA programming language.

COURSE OUTCOMES

1. Apply Object Oriented Programming concepts and basic features of Java to write programs for solving problems
2. Write java programs with objects and classes of java
3. Develop real time systems using java inheritance concepts
4. Build java applications using exceptions and I/O
5. Solve real time problems using java packages and connect java applications with relational databases using JDBC for storing and retrieving sensitive data

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Introduction to Object Orientation- Need for Object Oriented Paradigm- Characteristics of Object Oriented Programming - The History and Evolution of Java – An Overview of Java – Java Virtual Machine - Data Types – Variables - Arrays – Operators- Control Statements - Command Line Arguments

UNIT II OBJECTS AND CLASSES 9

Introducing Classes - Class fundamentals - Declaring Objects – Introducing Methods – Constructors- Parameterized Constructor – Copy Constructor – this keyword- Method Overloading – Constructor Overloading –Access control – Static keyword– Nested and Inner classes – Local Inner class

UNIT III INHERITANCE AND INTERFACE 9

Inheritance basics – Types of Inheritance – Super keyword – Method Overriding – Abstract Classes - final keyword- Interfaces- Default Interface Methods-Use static methods in an interface- Nested interfaces

UNIT IV EXCEPTION HANDLING AND I/O 9

Exception Handling Fundamentals – Exception Types – Uncaught Exception – Using try and catch – Multiple catch clauses – Nested try statements – throw – throws – finally - finalize method - I/O FileInputStream – I/O FileOutputStream

UNIT V PACKAGES AND JDBC CONNECTIVITY 9

Working with predefined and user defined packages - Access Protection – Importing Packages - Basics of JDBC Connectivity – SQL Queries – create – insert – select - delete – update.

Total: 45 hours

TEXT BOOK

1. Herbert Schildt, “Java™: The Complete Reference”, Ninth Edition, Tata McGraw Hill, 2014.

REFERENCES

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Ninth Edition, Prentice Hall, 2013.
2. K. Arnold, D. Holmes and J. Gosling, “The JAVA programming language”, Fourth Edition, Addison Wesley Professional, 2005.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Third Edition, Addison Wesley, 2000.
4. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, Fifth Edition, Tata McGraw-Hill Publishing company Ltd., 2009.

PREAMBLE

Python is an easy to learn, powerful programming language. It has efficient high-level data structures. It is a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. This programming language has become a preferred development technology in IT industries.

Python can be integrated with many other technologies also. It is rapidly becoming a de-facto language for data analytics and / or machine learning as many packages are added to perform more complex tasks. This course aims to teach everyone the basics of programming using Python.

COURSE OUTCOMES

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

1. Write simple applications
2. Develop programs using loops
3. Create applications using functions
4. Develop application using files
5. Create application using Python and MySQL

UNIT I INTRODUCTION

9

The way of programming-What is programming- debugging – formal and natural languages - Python: Features - Installing - Running – The Basics-variables-Operators and Expressions

UNIT II CONTROL FLOW

9

Control Flow: introduction- if – else – while statement – do while – for loop –break – continue

UNIT III PYTHON FUNCTIONS

9

Sequences: String - List – Tuple – Dictionary - Functions – Function Parameters, Local and Global Variables, Default Arguments, Keyword Arguments, Return Statements.

UNIT IV PYTHON MODULES, PACKAGES AND FILES

9

Introduction – Byte files – from import – making own modules – Files and Input/Output: File Objects and Built in functions – Command line Arguments – Packages.

UNIT V PYTHON DATABASE CONNECTIVITY

9

SQL Introduction – simple queries – create - insert – update – delete, MySQL Introduction – connecting python and MySQL database.

Total: 45 hours**TEXT BOOK**

1. Swaroop C N, “ A Byte of Python “, ebsshelf Inc., 1st Edition, 2013.

REFERENCES

1. Wesley J. Chun, “Core Python Programming”, Pearson, 2nd Edition, 2006.
2. Allen B.Downey, “Think Python: How to Think Like a Computer Scientist”, O'Reilly Media, 2nd Edition, 2015.

U15IT1005R INTRODUCTION TO DATABASE TECHNOLOGY 3 0 0 3

PREAMBLE

The objective of this course is to introduce the concepts of database systems. Any of the digital applications used by the people be it web applications or mobile applications run with the database in the background. For any e-commerce application like flipkart or amazon, database is the core requirement. Social media sites like Facebook or Twitter stores all the content such as user profiles, likes, shares, and messages in the database. All the organizations maintain their data in the database with lots of security features. Working with a database system is the most important skill needed by the IT industry.

The course is designed in such a way that the students will acquire necessary skills to store, manipulate and retrieve data. The students will learn the fundamental concepts of database systems and write queries to manipulate the database. The students will have hands on experience in working with an open source database management system. This course is designed for the students of both circuit (EEE, ECE) and non-circuit branches (Mechanical, Civil and Fashion Technology).

COURSE OUTCOMES

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

1. Comprehend the need, background, architecture and evolution of database management system
2. Construct ER diagrams that capture the requirements of an application and map the ER diagram to relational databases
3. Write SQL queries to create, maintain, retrieve, manipulate and provide security to databases.
4. Design and evaluate the normality of a logical data model, and correct any anomalies.
5. Summarize the general ideas behind indexing techniques

UNIT I INTRODUCTION 9

Database and Database Users: Characteristics of database approach, Advantages of DBMS Approach, Database Applications

Database system concepts and architecture: Data models, Schemas, Instance, Three schema architecture and data independence, DBMS languages, DBMS interfaces, database system Environment

UNIT II ENTITY RELATIONSHIP AND RELATIONAL MODEL 9

ER model: Entity types, attributes, keys,, relationship types, constraints, weak entity, ER diagrams, EER concepts

Relational data model, relational constraints and relational Algebra: Relational model concepts, Relational constraints and Relational data base schema, update operations, basic Relational algebra operations, additional relational operations, ER to relational mapping

UNIT III QUERY LANGUAGE 9

SQL: Data definition and constraints, Basic queries, insert, delete, update, Joins, complex queries, views, assertions and triggers

Database security and Authorization: security issues, grant/revoke privileges, SQL injections

UNIT IV RELATIONAL DATABASE DESIGN 9

Functional dependencies and normalization: Functional dependencies, Normal forms: 1NF, 2NF, 3NF, Boyce Codd NF, decomposition

Secondary Storage Devices – Placing file records – Operations on files – unordered files – ordered files - hashing – RAID - Indexing Structures: Types of Single-Level Ordered Indexes, Multilevel Indexes

Total: 45 hours

TEXT BOOK

1. Ramez Elmasri and Shamkant Navathe, “Fundamentals of Database Systems ”, 6th Edition, Addison-Wesley, 2014.

REFERENCES

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, “Database System Concepts”, 6th Edition, McGraw-Hill, 2016
2. Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003
3. Date. C. J, Kannan. A, Swamynathan. S, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2012
4. [Rajesh Narang](#), “Database Management systems”, PHI Learning pvt. Ltd, New Delhi, 201

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VII 2015R (CBCS)
Branch: Information Technology

| S.No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|----------------------|-------------|--|---------|----------|-----------|-----------|---------------------|
| Theory | | | | | | | |
| 1 | U15GE701R | Professional Ethics and Human Values | 3 | 0 | 0 | 3 | 45 |
| 2 | U15IT701R | Cryptography and Network Security | 3 | 0 | 2 | 4 | 75 |
| 3 | U15IT702R | Human Computer Interaction | 2 | 0 | 2 | 3 | 60 |
| 4 | U15IT925R | Elective – Intellectual Property Rights | 3 | 0 | 0 | 3 | 45 |
| | U15IT930R | Big data Technologies | | | | | |
| 5 | U15IT936R | Elective – Mobile Computing | 3 | 0 | 0 | 3 | 45 |
| | U15IT938R | Business Intelligence | | | | | |
| Open Elective | | | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 | 45 |
| | U15CE1003R | Energy Efficiency And Green Building | | | | | |
| | U15EE1004R | Energy Conservation And Management | | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | | |
| | U15EE1007R | Innovation, IPR And Entrepreneurship Development | | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | | |
| | U15FT1003R | Garment Manufacturing Technology | | | | | |
| | U15MC1002R | 3D Printing Technology | | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | | |
| | U15ME1004R | Industrial Safety | | | | | |
| | U15ME1005R | Maintenance Engineering | | | | | |
| U15ME1010R | 3D Printing | | | | | | |
| Practical | | | | | | | |
| 7 | U15IT703R | Mobile Applications Development Laboratory | 0 | 0 | 4 | 2 | 60 |
| 8 | U15IT704R | Cloud Computing Laboratory | 0 | 0 | 4 | 2 | 60 |
| 9 | U15IT705R | Comprehension / Term Paper | 0 | 0 | 2 | 1 | 30 |
| Total | | | | | | 24 | |

Approved By
Chairperson, Information Technology BoS
 Dr.J.Akilandeswari

Member Secretary, Academic Council
 Dr.R.Shivakumar

Chairperson, Academic Council & Principal
 Dr.S.R.R.Senthil Kumar

Copy to:- HOD/Information Technology, Seventh Semester B.Tech IT Students and Staff, COE

COURSE OUTCOMES:

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

1. Identify the core values that shape the ethical behavior of an engineer.
2. Utilize opportunities to explore one’s own values in ethical issues.
3. Apply codes of ethics and standards in the engineering field.
4. Explore various safety issues and ethical responsibilities of an engineer.
5. Recognize and resolve global issues.

| CO / PO, PSO Mapping | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | | | | | | 3 | | 3 | 2 | | 1 | | | |
| CO2 | | | 2 | 2 | | 3 | | 3 | 2 | | 1 | | | |
| CO3 | | | 2 | 2 | | 3 | | 3 | 2 | | 3 | | | |
| CO4 | | | 3 | 2 | | 3 | | 3 | 2 | | 1 | | | |
| CO5 | | | 3 | | | 3 | 3 | 3 | 2 | | 1 | | | |

UNIT-I HUMAN VALUES 9

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT -II ENGINEERING ETHICS 9

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Profession and Professionalism – Professional Ideals and Virtues – Theories of Right action- Uses of Ethical Theories.

UNIT-III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Contrasts with standard experiments- Engineers as Responsible Experimenters – Importance and limitations of Codes of Ethics - Industrial Standards - A Balanced Outlook on Law – Case Study: Space shuttle challenger disaster.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Types of risk - Assessment of Safety and Risk – Risk Benefit analysis- Reducing Risk – Case Studies -Chernobyl and Bhopal plant disaster.

Collegiality and Loyalty – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Importance and consequences of whistle blowing - Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Multinational Corporations – Environmental Ethics – Computer Ethics and Internet- Engineers and Technological progress – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Participation in professional societies- Sample Code of Conduct (pertaining to specific professional societies).

Total: 45 hours

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, Indian Edition, Tenth reprint, 2017.
2. Professional Ethics and Human values- Sonaversity, Edition 2018.

REFERENCES

1. Charles D Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 2012.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2016.
3. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2000.
4. R.Subramanian , “Professional Ethics “,Oxford University Press ,Reprint ,2015.
5. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, 2001.
6. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, 2003.

COURSE OUTCOMES

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

1. Describe various types of attacks with their characteristics and apply classical encryption algorithms, DES and AES methods to encrypt the data
2. Select and apply appropriate public key cryptographic algorithms like RSA Encryption, Diffie-Hellman Key Exchange and Elliptic Curve Cryptography to ensure the confidentiality with the concept of number theory
3. Apply Hash and MAC algorithms to ensure integrity of data by analyzing authentication requirements
4. Describe and apply various protocols to ensure Email security, IP security and Web Security.
5. Apply system level security with design of firewalls, intrusion detection techniques, virus and worms analysis

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 2 | 3 | 3 | 2 | 2 | | | | | | | | 2 | |
| CO2 | 3 | 3 | 3 | 2 | 2 | | | | | | | | 2 | 3 |
| CO3 | | 3 | 3 | 2 | 2 | | | | | | | | | 3 |
| CO4 | | 3 | 3 | 2 | 2 | | | | | | | | | 2 |
| CO5 | | 3 | 3 | 2 | 2 | | | | | | | | 2 | 3 |

UNIT I INTRODUCTION AND SYMMETRIC CIPHER**9**

OSI Security Architecture: Security Attacks, Security Services, and Security Mechanisms - Classical Encryption techniques: Substitution Techniques, Transposition Techniques, Steganography – Block Cipher Principles – Data Encryption Standard (DES) – DES algorithm, Avalanche effect, Strength of DES – Advanced Encryption Standard (AES): AES Structure, AES Transformation Functions, AES Key Expansion – Block Cipher Modes of Operation.

UNIT II ASYMMETRIC CIPHER**9**

Basic concepts in Number Theory–Euclidean algorithm, Modular arithmetic - Prime Numbers, Fermat's and Euler's Theorem, Discrete Logarithms – Principle of Public-Key cryptosystem- RSA algorithm – Diffie-Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.

UNIT III AUTHENTICATION AND DATA INTEGRITY ALGORITHMS**9**

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two simple hash Functions, Requirements and Security, SHA-512 – Message Authentication Code: Message Authentication

Requirements, Message Authentication Functions, Requirements for MACs, Security of MACs, HMAC – Digital Signature: Properties and Requirements, Digital Signature Standard (DSS).

UNIT IV KEY MANAGEMENT AND INTERNET SECURITY 9

Symmetric Key Distribution using Symmetric Encryption and Asymmetric Encryption – Distribution of Public keys – Public-Key Infrastructure – Transport-Level Security: SSL Architecture, – Electronic Mail Security : Pretty Good Privacy (PGP) – IP Security : IP Security overview, Encapsulating Security Payload (ESP).

UNIT V SYSTEM SECURITY 9

Intrusion Techniques- Statistical Anomaly Detection-Rule-Based Intrusion Detection -Password Management – Types of Malicious Software- Nature of Viruses- Virus Classification - Virus Countermeasures- Distributed Denial of Service Attacks- DDoS Attack Description, Constructing the Attack Network, DDoS Countermeasures – Firewall- Need for Firewalls, Firewall Characteristics-,Types of Firewalls.

Practical: 30 hours Total: 75 hours

TEXT BOOK

1. William Stallings, “Cryptography and Network Security – Principles and Practice”, Pearson Education, Fifth Edition, 2011.

REFERENCES

1. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill, Second Edition, 2008.
2. Alfred J. Menezes, “Handbook of Applied Cryptography”, CRC Press, 1997.
3. Bragg, “Network Security: The Complete Reference”, Tata McGraw-Hill Education, 2004.
4. Jeff Duntemann, “Degunking your email, spam, and viruses”, Paraglyph Press, 2004
5. Douglas Robert Stinson, “Cryptography: Theory and Practice”, Chapman & Hall/CRC, 2006.

LIST OF EXPERIMENTS

Implementation of the following experiments using C++/Java

1. Mono alphabetic and poly alphabetic substitution ciphers
2. Hill Cipher
3. Transposition Techniques
4. Single round of DES
5. RSA
6. Diffie Hellman key exchange algorithm.
7. Random number generator
8. Fermat’s theorem, Euler’s theorem and Euclidian algorithm
9. Hashing technique
10. Digital signature using DSS
11. Simple Firewall

COURSE OUTCOMES

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

1. Identify the usability levels for interactive systems.
2. Analyse the development process involved in user interface.
3. Develop skills in handling virtual environments and its exploitation.
4. Explain the different languages available to communicate with computers.
5. Comprehend the diverse input methods available for interfacing.

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | | | | | | | | | 1 | | | |
| CO2 | 3 | 3 | 3 | | | | | | | | 1 | 1 | | |
| CO3 | 3 | 3 | 3 | | | | | | | 1 | 1 | 1 | | |
| CO4 | 3 | 2 | | | | | | | | | 1 | | | |
| CO5 | 3 | | 3 | | | | | | 1 | | 1 | | | |

UNIT I INTRODUCTION**6**

Usability of Interactive systems: Usability Goals and Measures – Usability Motivations – Universal Usability – Guidelines, Principles, and Theories: Guidelines – Principles – Theories.

UNIT II MANAGING DESIGN PROCESS**6**

Managing Design Process: Introduction – Organizational Design to Support Usability – Four Pillars of Design – Development Methodologies – Ethnographic Observation – Participatory Design – Scenario Development-Evaluating Interface Design: Expert Reviews – Usability Testing and Laboratories – Survey Instruments – Acceptance Test – Evaluation During Active Use – Controlled Psychologically Oriented Experiments.

UNIT III MANIPULATION AND VIRTUAL ENVIRONMENTS**6**

Introduction-Examples of Direct Manipulation Systems –Discussion of Direct Manipulation-3D Interfaces – Teleoperation – Virtual Augmented Reality – Menu Selection, Form Fill-in, and Dialog Boxes: Task-Related Menu organization –Single Menus – Combinations of Multiple Menus – Form Fill-in, Dialog Boxes, and Alternatives.

UNIT IV COMMAND AND NATURAL LANGUAGES**6**

Command and Natural Languages: Command –Organization Functionality, Strategies, and Structure – Naming and Abbreviations – Natural Language in Computing.

Introduction – Keyboards and Keypads – Pointing Devices – Speech and Auditory Interfaces – Small and Large Displays – Collaboration and Social Media Participation: Goals of Collaboration and Participation – Asynchronous Distributed Interfaces – Synchronous Distributed Interfaces – Face to Face Interfaces.

Total: 60 Hours

TEXT BOOK

1. Ben Shneiderman, Plaisant, Cohen, Jacobs, "Designing the User Interface", 5th Edition, Addison-Wesley, 2013.

REFERENCES

1. Barfield, Lon, "The User Interface: Concepts and Design", Addison –Wesley, 2004.
2. Wilbert O. Galiz, "The Essential guide to User Interface Design", Wiley Dreamtech, 2010.
3. Alan Cooper, "The Essentials of User Interface Design", Wiley India Pvt. Ltd, 2010.
4. Alan Dix et al, "Human - Computer Interaction ", Prentice Hall, 1993.

LIST OF EXPERIMENTS

1. Know your client.
2. Understand the need of colors and animation.
3. HCI design principles- heuristic evaluation.
4. Importance of menus and navigation.
5. Design user interface for mobile application.
6. Icon designing.

COURSE OUTCOMES

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

1. Write android based programs to create simple applications using communication features and multimedia
2. Write android based programs with maps and database connectivity
3. Build an iOS application using Xcode

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 1 | 1 | 1 | 1 | | | | | | 1 | | | | |
| CO2 | 3 | 3 | 3 | 3 | 2 | | | | | 3 | 3 | | 2 | |
| CO3 | 3 | 3 | 3 | 3 | 3 | | | | | 3 | 3 | | | 3 |

LIST OF EXPERIMENTS

1. Calculator with simple operations.
2. Android application for the demonstration of date time picker and alarm manager.
3. Creating an application with multiple activities and a simple menu using listview.
 - A. Sending SMS with toast notification from android application,
 - B. Sending an email from android application.
4. Implement an application that implements Multi-threading
5. Using audio and video functions in android application.
6. Develop an application that makes use of RSS Feed.
7. Application development using web service in android.
8. Android application for obtaining user location using GPS.
9. Android application for database connectivity with MySQL.
10. Implement an application that writes data to the SD card.
11. Develop an iOS application that uses GUI components.
12. Develop an iOS application to demonstrate the use of imageview.

Total: 60 hours

COURSE OUTCOMES

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

1. Run virtual machines of different configuration, install programs in virtual machines and run the programs
2. Install cloud platforms and write applications
3. Explore different cloud services and summarize the usage

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 1 | 1 | 1 | | | | | | | 1 | | | | |
| CO2 | 3 | 3 | 3 | | 2 | | | | | 2 | 2 | | 1 | |
| CO3 | 3 | 3 | 3 | 3 | 3 | | | | | 1 | 2 | | | 2 |

LIST OF EXPERIMENTS:

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at a particular time.
2. Install a C compiler in the virtual machine and execute a sample program.
3. Show the virtual machine migration based on the certain condition from one node to the other.
4. To install and understand the features of ownCloud as SaaS
5. Install and Configure Hadoop.
6. Write a program to use the API's of Hadoop to interact with it.
7. Write a word count program to demonstrate the use of Map and Reduce tasks.
8. Mount the one node Hadoop cluster using FUSE.
9. Create a Warehouse Application in Salesforce.com.
10. Create developer account with the following specifications in a CRM
 - a. Create objects and required fields to maintain the student database in cloud.
 - b. Create formula fields to calculate total marks, Grade and the result.
 - c. Apply validation rules when entering marks more than the certain criteria.
11. Case study on AWS
12. Case study on Open stack

TOTAL: 60 HOURS

COURSE OUTCOMES

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

1. Explain the. Importance of intellectual property rights
2. Evaluate trade mark
3. Develop and register patent
4. Discuss trade secrete law
5. Explain new developments of intellectual property

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 1 | 1 | 1 | | | | | | 1 | | | | |
| CO2 | 3 | 3 | 3 | | | | | | | | 1 | 1 | | |
| CO3 | 3 | 3 | 3 | | | | | | | 1 | 2 | 1 | | |
| CO4 | 3 | 2 | | | | | | | | | 1 | | | |
| CO5 | 3 | 3 | | | | | | | | 1 | | | | |

UNIT - I INTRODUCTION**9**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II TRADE MARKS:**9**

Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III LAW OF COPY RIGHTS**9**

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV TRADE SECRETS**9**

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TOTAL: 45 HOURS

TEXT BOOKS

1. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets”, Delmar Cengage Learning, 4th Edition, 2012.
2. Prabuddha Ganguli, “Intellectual Property Rights: Unleashing the Knowledge Economy”, Tata Mc Graw Hill Education, 1st Edition, 2008.

REFERENCES

1. D Llewelyn & T Aplin W Cornish, “Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights”, Sweet and Maxwell, 1st Edition, 2016.
2. Ananth Padmanabhan, “Intellectual Property Rights-Infringement And Remedies”, Lexis Nexis, 1st Edition, 2012.
3. Ramakrishna B and Anil Kumar H.S, “Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers”, Notion Press, 1st Edition, 2017.

COURSE OUTCOMES

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

1. Explain the need and challenges of Bg data and analytics
2. Apply and write jobs in Hadoop and map reduce framework
3. Create NoSQL database and apply CRUD operations in MongoDB
4. Create database and apply CRUD operations in Cassandra and Hive
5. Write PigLatin scripts for database maintenance and explore application areas and techniques applied in different domains

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | | | | | | | | | 1 | | | |
| CO2 | 3 | 2 | | | | | | | | | 1 | | | |
| CO3 | 3 | 3 | 3 | | | | | | | | 1 | 1 | | |
| CO4 | 3 | 3 | 3 | | | | | | | 1 | 1 | 1 | | |
| CO5 | 3 | 2 | | | | | | | | | 1 | | | |

UNIT I INTRODUCTION**9**

Types of Digital Data – Introduction to Big Data - Big Data Analytics - classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Why is Big Data Analytics Important? - Data Science - Terminologies Used in Big Data Environment - Few Top Analytics Tools.

UNIT II TECHNOLOGIES, HADOOP AND MAP REDUCE**9**

The big data technology landscape – NoSQL – Hadoop - Introduction to Hadoop - RDBMS versus Hadoop - RDBMS versus Hadoop - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem – Introduction to Map reduce Programming

UNIT III MONGODB**9**

Introduction to MongoDB - What is MongoDB? - Why MongoDB? - RDBMS and MongoDB - Data Types in MongoDB – MongoDB Query Language

UNIT IV CASSANDRA AND HIVE**9**

Introduction to Cassandra - Features of Cassandra - CQL Data Types – CQLSH – Keyspaces - CRUD – Collections – Alter - Import and Export – querying system tables

UNIT V PIG AND RECENT TRENDS

9

Introduction to Pig - The Anatomy of Pig - Pig on Hadoop - Pig Latin Overview - Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational operators - Eval Function - Complex Data Type - User Defined Function - parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig versus Hive - Reporting tool – Trends – Case study

TOTAL: 45 HOURS

TEXT BOOK

1. Seema Acharya and Subhashini C, “Big Data and Analytics”, Wiley India, 2014.

REFERENCES

1. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman, “Big data for dummies”, Wiley, 2013.
2. Chuck Lam, “Hadoop in action”, Manning Publications, 2010.
3. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education, 2012.
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
6. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
7. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
8. Alan Gates, "Programming Pig", O'Reilley, 2011.

COURSE OUTCOMES

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

1. Explain the basics of Wireless voice and data communications technologies
2. Explain the working principles of wireless LAN and its standards
3. Explain about various protocols in network layer
4. Comprehend various Transport layer algorithms
5. Explain and identify various security issues in mobile and their protocols

| CO / PO, PSO Mapping | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
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| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 1 | 2 | | | | | | 1 | | | | | 3 | 2 |
| CO2 | | 1 | | 2 | | | | | | | | | 3 | 1 |
| CO3 | | 2 | | 2 | | | | 3 | | | | | 3 | 1 |
| CO4 | | 1 | | 2 | | | | 2 | | | | | 3 | 2 |
| CO5 | 1 | | | | 3 | | | | | | | 3 | 1 | 2 |

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

Introduction ,Wireless transmission, Frequencies for radio transmission, Signals , Antennas, Signal Propagation ,Multiplexing ,Modulations ,Spread spectrum ,MAC , SDMA , FDMA , TDMA, CDMA.

UNIT II WIRELESS LAN 9

Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a - 802.11b standards – Blue Tooth.

UNIT III MOBILE NETWORK LAYER 9

Mobile IP – Goals, IP Packet Delivery, Agent Advt and Discovery, Registration, Tunneling and Encapsulation, Optimizations, Dynamic Host Configuration Protocol - Routing – DSDV ,DSR

UNIT IV TRANSPORT LAYER AND APPLICATION LAYERS 9

Traditional TCP , congestion control, Slow start, Fast Retransmit/recovery, Indirect , snooping, mobile tcp, Transaction oriented TCP, Classical TCP improvements, Introduction to WAP.

UNIT V MOBILE SECURITY 9

Introduction to security issues, information security, Security Techniques and algorithms, security protocols, public key infrastructure.

TOTAL : 45 HOURS

TEXT BOOKS

1. Jochen Schiller, “Mobile Communications”, PHI/Pearson Education, Second Edition, 2012.(Unit 1 to 4)
2. Asoke K Talukder, Hasan Ahmed, Roopa R yavagal, “Mobile Computing”, Second Edition, TMH 2013. (Unit 5)

REFERENCES

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2012.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2013.
3. Hazysztof Wesolowshi, “Mobile Communication Systems”, John Wiley and Sons Ltd, 2012.

COURSE OUTCOMES

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

1. Explain the technology and processes associated with Business Intelligence framework
2. Explain data warehouse implementation methodology, project life cycle and multidimensional data modeling.
3. Given a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal
4. Design an enterprise dashboard that depicts the key performance indicators which helps in decision making
5. Comprehend application of BI concepts and build BI models using open source tools (Kettle software) /MS Office

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
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| CO1 | 3 | 3 | 3 | | | | | | | 1 | 1 | 1 | | |
| CO2 | 3 | 2 | | | | | | | | | 1 | | | |
| CO3 | 3 | 3 | 3 | | 2 | | | | | 1 | | | | |
| CO4 | 3 | 1 | 1 | 1 | | | | | | 1 | | | | |
| CO5 | 3 | 3 | 3 | | | | | | | | 1 | 1 | | |

UNIT-I INTRODUCTION TO BUSINESS INTELLIGENCE**9**

Introduction to digital data: Introduction, Types – structured, semi-structured and unstructured

Introduction to OLTP and OLAP: OLTP Vs OLAP, Architectures (MOLAP, ROLAP, HOLAP), OLAP Operations

BI Definitions & Concepts: BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices

UNIT-II BASICS OF DATA INTEGRATION**9**

Data Integration: Concepts, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications.

Kettle Software: Introduction to ETL using Pentaho data Integration

UNIT-III INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING 9

Multidimensional data model : Introduction to data and dimension modeling, data modeling basics, Types, Techniques, fact and dimension tables, Dimensional models

Measures and Metrics: Introduction to business metrics and KPIs, KPI usage in companies

Creating cubes using Microsoft Excel

UNIT-IV BASICS OF ENTERPRISE REPORTING 9

Reporting: A typical enterprise, Malcolm Baldrige - quality performance framework, Balanced scorecard, Enterprise dashboard, Balanced scorecard vs. enterprise dashboard, Best practices in the design of enterprise dashboards

Enterprise reporting using MS Access / MS Excel

UNIT –V BI APPLICATIONS AND CASE STUDIES 9

Applications: Understanding BI and mobility, BI and cloud computing, BI for ERP systems, Social CRM and BI

Case Study Briefs: Good Lift HealthCare group, Ten to Ten retail store

TOTAL: 45 HOURS

TEXT BOOK

1. RN Prasad and Seema Acharya, “Fundamental of Business Analytics”, Wiley India Pvt. Ltd, 2012.

REFERENCES

1. John Boyer, Bill Frank, Brian Green, Tracy Harris, and Kay Van De Vanter “Business Intelligence Strategy: A Practical Guide for Achieving BI Excellence”, IBM Corporation, 2010.
2. Swain Scheps “Business Intelligence for Dummies”, Wiley Publishing Inc, 2008.
3. Cindi Howson “ Successful Business Intelligence: Secrets to making BI a killer App”, McGraw Hill, 2008.
4. Elizabeth Vitt, Michael Luckevich, Stacia Misner “Business Intelligence: Making Better Decisions Faster”, Microsoft Press, 2008.

PREAMBLE

The students opting for this course will learn to code in Java and improve the programming and problem-solving skills. Through this course, the students will acquire appropriate skills to design algorithms as well as develop and debug programs. We are excited to offer a unique course structure, designed to support learners of different engineering departments and to fulfill their dreams of pursuing a career in an IT industry.

This course aims to satisfy the curiosity of the learners who wants to know how a ticket is booked in railways, or how an electricity consumption bill is generated. After the completion of the course, learners will be able to code real time problems in JAVA programming language.

COURSE OUTCOMES

1. Apply Object Oriented Programming concepts and basic features of Java to write programs for solving problems
2. Write java programs with objects and classes of java
3. Develop real time systems using java inheritance concepts
4. Build java applications using exceptions and I/O
5. Solve real time problems using java packages and connect java applications with relational databases using JDBC for storing and retrieving sensitive data

| CO / PO, PSO Mapping | | | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | |
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| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | | 3 | 3 | 2 | 3 | | | | | | | | | 3 |
| CO2 | | 3 | 3 | 2 | 3 | | | | | | | | | 3 |
| CO3 | | 3 | 3 | 2 | 3 | | | | | | | | | 3 |
| CO4 | | 3 | 3 | 2 | 3 | | | | | | | | | 3 |
| CO5 | | 3 | 3 | 2 | 3 | | | | | | | | | 3 |

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Introduction to Object Orientation- Need for Object Oriented Paradigm- Characteristics of Object Oriented Programming - The History and Evolution of Java – An Overview of Java – Java Virtual Machine - Data Types –Variables - Arrays – Operators- Control Statements - Command Line Arguments

UNIT II OBJECTS AND CLASSES 9

Introducing Classes - Class fundamentals - Declaring Objects – Introducing Methods – Constructors- Parameterized Constructor – Copy Constructor – this keyword- Method Overloading – Constructor Overloading –Access control – Static keyword– Nested and Inner classes – Local Inner class

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester VIII 2015R (CBCS)
Branch: Information Technology

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|----------------------|--------------------|---------------------|----------------|-----------------|------------------|---------------|----------------------------|
| Practical | | | | | | | |
| 1 | U15IT801R | Project Work | 0 | 0 | 24 | 12 | 360 |
| Total Credits | | | | | | 12 | |

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

Copy to:-
HOD/Information Technology, Eighth Semester B.Tech IT Students and Staff, COE