# SONA COLLEGE OF TECHNOLOGY, SALEM-5

**(An Autonomous Institution)**

## B.E- Computer Science and Engineering

# 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: CSE**

| S.No. | Course Code | Course Title | L | T | P | C | Group code |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | U15ENG101AR | Technical English – I | 2 | 0 | 2 | 3 | HS |
| 2 | U15MAT102BR | Engineering 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 | **Chairperson BOS/CSE & HOD-CSE** Dr. B. Sathiyabhama | **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: CSE**

| S.No. | Course Code | Course Title | L | T | P | C | Group code |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | U15ENG201AR | Technical English –II | 2 | 0 | 2 | 3 | HS |
| 2 | U15MAT202BR | Engineering 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 | U15OLE21202 | 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 | **Chairperson BOS/CSE & HOD-CSE** Dr. B. Sathiyabhama | **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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15MAT301BR | Discrete Mathematics | 3 | 2 | 0 | 4 |
| 2 | U15CS301R | Data Structures | 3 | 0 | 0 | 3 |
| 3 | U15CS302R | Digital Principles and System Design | 3 | 0 | 0 | 3 |
| 4 | U15CS303R | Object Oriented Programming using C++ | 3 | 0 | 0 | 3 |
| 5 | U15CS304R | Computer Organization and Architecture | 3 | 2 | 0 | 4 |
| | | | | | | |
| 6 | U15CS305R | Data Structures and Object Oriented Programming Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS306R | Digital Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15ENG301R | Communication Skills Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15GE301R | Soft Skills and Aptitude – I | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **23** |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| **Dr.B.Sathiyabhama** | **Dr.R.Shivakumar** | **Dr.S.R.R.Senthil Kumar** |

Copy to:-
HOD/Computer Science and Engineering, Third Semester BE CSE 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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15MAT401BR | Probability and Queuing Theory | 3 | 2 | 0 | 4 |
| 2 | U15CS403R | Database Management Systems | 3 | 0 | 0 | 3 |
| 3 | U15CS402R | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | U15CS401R | Design and Analysis of Algorithms | 3 | 2 | 0 | 4 |
| 5 | U15CS404R | Web Programming | 3 | 0 | 2 | 4 |
| **Practical** | | | | | | |
| 6 | U15CS405R | Operating Systems Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS406R | Database Management Systems Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15GE401R | Soft Skills and Aptitude – II | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **23** |

**Approved By**

**Chairperson, Computer Science and Engineering BoS**
**Dr.B.Sathiyabhama**

**Member Secretary, Academic Council**
**Dr.R.Shivakumar**

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

Copy to:-
HOD/Computer Science and Engineering, Fourth Semester BE CSE 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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15CS501R | Software Engineering | 3 | 0 | 0 | 3 |
| 2 | U15CS502R | Computer Networks | 3 | 0 | 0 | 3 |
| 3 | U15CS503R | Embedded Systems Design | 3 | 0 | 0 | 3 |
| 4 | U15CS504R | Theory of Computation | 3 | 0 | 0 | 3 |
| 5 | U15CS902R | **Elective –** Multimedia System | 3 | 0 | 0 | 3 |
| | U15CS904R | **Elective –** Data Warehousing and Data Mining | | | | |
| **Practical** | | | | | | |
| 6 | U15CS505R | Computer Networks Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS506R | Python Programming Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15GE501R | Soft Skills and Aptitude – III | 0 | 0 | 2 | 1 |
| 9 | U15ENG501R | Professional Communication Skills Laboratory | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **21** |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| **Dr.B.Sathiyabhama** | **Dr.R.Shivakumar** | **Dr.S.R.R.Senthil Kumar** |

Copy to:-

HOD/Computer Science and Engineering, Fifth Semester BE CSE 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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15GE602AR | Principles of Management | 3 | 0 | 0 | 3 |
| 2 | U15CS601R | Principles of Compiler Design | 3 | 0 | 0 | 3 |
| 3 | U15CS602R | Internet of Things | 3 | 0 | 0 | 3 |
| 4 | U15CS919R | **Elective –** Software Project Management | 3 | 0 | 0 | 3 |
| 5 | noc21-cs35 | **Elective –** Deep Learning –IIT Ropar | 3 | 0 | 0 | 3 |
| **Open Elective** | | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 |
| | U15CE1003R | Energy Efficiency and Green Building | | | | |
| | U15CE1004R | Municipal Solid Waste Management | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | |
| | U15EC1006R | Sensors and Smart Structures Technologies | | | | |
| | U15EE1001R | Electric Mobility | | | | |
| | U15ME1004R | Industrial Safety | | | | |
| **Practical** | | | | | | |
| 7 | U15CS603R | Compiler Design Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15CS604R | Internet of Things Laboratory | 0 | 0 | 4 | 2 |
| 9 | U15CS605R | Creative and Innovative Project | 0 | 0 | 2 | 1 |
| 10 | U15GE601BR | Soft Skills and Aptitude – IV | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **24** |

**Approved By**

**Chairperson, Computer Science and Engineering BoS** **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
**Dr.B.Sathiyabhama** **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

**Copy to:-**

HOD/Computer Science and Engineering, Sixth Semester BE CSE 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: Computer Science and Engineering**

| 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 | U15CS701R | Security in Computing | 3 | 0 | 0 | 3 | 45 |
| 3 | U15CS702R | Artificial Intelligence | 3 | 0 | 0 | 3 | 45 |
| 4 | U15CS927R | **Elective** - Cloud Computing | 3 | 0 | 0 | 3 | 45 |
| 5 | U15CS934R | **Elective** -Software Testing | 3 | 0 | 0 | 3 | 45 |
| | | **Open Elective** | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 | 45 |
| | U15CE1003R | Energy Efficiency and Green Building | | | | | |
| | U15EC1008R | Mobile Technology and its Application | | | | | |
| | 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 | Industry Safety | | | | | |
| | U15ME1005R | Maintenance Engineering | | | | | |
| | U15ME1010R | 3D Printing | | | | | |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| Dr.B.Sathiyabhama | Dr.R.Shivakumar | Dr.S.R.R.Senthil Kumar |

Copy to:-

HOD/Computer Science and Engineering, Seventh Semester BE CSE Students and Staff, COE

| Practical | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | U15CS703R | Full Stack Laboratory | 0 | 0 | 4 | 2 | 60 |
| 8 | U15CS704R | Machine Learning Laboratory | 0 | 0 | 4 | 2 | 60 |
| 9 | U15CS705R | Comprehension And Technical Report | 0 | 0 | 2 | 1 | 30 |
| | | | | | **Total Credits** | **23** | |

**Approved By**

**Chairperson, Computer Science and Engineering BoS**
Dr.B.Sathiyabhama

**Member Secretary, Academic Council**
Dr.R.Shivakumar

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

Copy to:-

HOD/Computer Science and Engineering, Seventh Semester BE CSE Students and Staff, COE

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

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|---|---|---|---|---|---|---|---|
| **Practical** | | | | | | | |
| 1 | U15CS801R | Project Work | 0 | 0 | 24 | 12 | 360 |
| | | | | | **Total Credits** | **12** | |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| Dr.B.Sathiyabhama | Dr.R.Shivakumar | Dr.S.R.R.Senthil Kumar |

Copy to:-

HOD/Computer Science and Engineering, Eighth Semester BE CSE 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: CSE**

| S.No. | Course Code | Course Title | L | T | P | C | Group code |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | U15ENG101AR | Technical English – I | 2 | 0 | 2 | 3 | HS |
| 2 | U15MAT102BR | Engineering 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 | **Chairperson BOS/CSE & HOD-CSE** Dr. B. Sathiyabhama | **Member Secretary, Academic Council** Dr. R. Shivakumar | **Chairperson, Academic Council & Principal** Dr. S.R.R. Senthilkumar |
|---|---|---|---|

## U15ENG101AR - 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.

## U15MAT102BR - ENGINEERING MATHEMATICS – I

(For CSE Branch)

| 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. describe the concept of limits and continuity and an ability to calculate and apply them.
2. explain functions of several variables, Taylor's series expansion, Jacobians and compute the maximum and minimum values by Lagrange's method of multipliers.
3. describe the basic concept of definite and indefinite integrals by trigonometric and irrational functions.
4. explain the double and triple integrals, discuss the change of order of integration and apply multiple integrals to find the area and volume.
5. explain the different types of ordinary differential equations and describe the various methods to solve ordinary differential equations.

**UNIT I – DIFFERENTIAL CALCULUS** **9+6**

Representation of functions – new functions from old functions – limit of a function – limits at infinity – continuity – derivatives – differentiation rules – maxima and minima of functions of one variable.

**UNIT II – FUNCTIONS OF SEVERAL VARIABLES** **9+6**

Partial derivatives – homogeneous functions and Euler's theorem – total derivative – differentiation of implicit functions – Jacobians – partial differentiation of implicit functions – Taylor's series for functions of two variables – maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

**UNIT III – INTEGRAL CALCULUS** **9+6**

Definite and indefinite integrals – substitution rule – techniques of integration – integration by parts – trigonometric integrals –trigonometric substitutions – integration of rational functions by partial fraction – integration of irrational functions.

**UNIT IV – MULTIPLE INTEGRALS** **9+6**

Double integrals – change of order of integration – double integrals in polar coordinates – area enclosed by plane curves – triple integrals – volume of solids – change of variables between Cartesian and polar coordinates.

**UNIT V – DIFFERENTIAL EQUATIONS** **9+6**

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

**Total: 75 Hours**

**TEXT BOOKS**


1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. J. Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.


**REFERENCE BOOKS**


1. S. Narayanan and T. K. Manicavachagom Pillai., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
2. T. Veerarajan, Engineering Mathematics for semesters I and II, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2012.
3. E. Kreyszig, "Advanced Engineering Mathematics", International Student Version, Wiley, 10th Edition, 2015.

## U15PHY103AR - ENGINEERING PHYSICS

(Common to B.E. Mech, Mechtronics, 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, $CO_2$ 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. Rajendran.V and Marikani. A, 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 Polythiopene– 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, Identifies 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. analyze 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: CSE**

| S.No. | Course Code | Course Title | L | T | P | C | Group code |
|---|---|---|---|---|---|---|---|
| **Theory** | | | | | | | |
| 1 | U15ENG201AR | Technical English –II | 2 | 0 | 2 | 3 | HS |
| 2 | U15MAT202BR | Engineering 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 | U15OLE21202 | 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 | **Chairperson BOS/CSE & HOD-CSE** Dr. B. Sathiyabhama | **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.

## U15MAT202BR - ENGINEERING MATHEMATICS – II

| 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 Eigen values and Eigen vectors of a real matrix and find them, discuss their properties, reduce a real symmetric matrix from Quadratic form to Canonical form.
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 a complex variable, its properties and discuss the problems involving conformal mapping.
4. describe the power series expansions of complex functions and the procedures of evaluating the complex integral.
5. define Laplace transform and its inverse, properties and solve the ordinary differential equations using Laplace transform.

**UNIT I – MATRICES** **9+6**

Eigenvalues and eigenvectors of a real matrix – characteristic equation – properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem (statement only) – diagonalisation of matrices – reduction of a quadratic form to canonical form by orthogonal transformation – nature of quadratic forms.

**UNIT II – VECTOR CALCULUS** **9+6**

Gradient and directional derivative – divergence and curl – irrotational and solenoidal vector fields – line integral over a plane curve – surface integral – area of a curved surface – volume integral – Green‘s, Gauss divergence and Stoke‘s theorems (statement only) – verification and application in evaluating line, surface and volume integrals.

**UNIT III – ANALYTIC FUNCTIONS** **9+6**

Analytic functions – necessary and sufficient conditions for analyticity – properties – harmonic conjugates – construction of analytic function – conformal mapping – $w = z + c$, $cz$, $1/z$ – bilinear transformation.

**UNIT IV – COMPLEX INTEGRATION** **9+6**

Line integral – Cauchy‘s integral theorem (statement only) – Cauchy‘s integral formula – Taylor‘s and Laurent‘s series – singularities – residues – residue theorem (statement only) – application of residue theorem for evaluation of real integrals – use of unit circular contour and semicircular contour with no pole on real axis.

**UNIT V – LAPLACE TRANSFORMS** **9+6**

Existence conditions – transforms of elementary functions – transform of unit step function and unit impulse function – basic properties – shifting theorems -transforms of derivatives and integrals – initial and final value theorems – inverse transforms – convolution theorem – transform of periodic functions – application to solution of linear ordinary differential equations with constant coefficients.

**Total: 75 Hours**

**TEXTBOOKS**


1. B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. T. Veerarajan, “Engineering Mathematics for semesters I and II”, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2012.


**REFERENCE BOOKS**


1. B. V. Ramana, “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., New Delhi, 30th Reprint, 2017.
2. N. P. Bali, M. Goyal, “Engineering Mathematics”, University Science Press, New Delhi, 9th Edition, 2011.
3. E. Kreyszig, “Advanced Engineering Mathematics”, International Student Version, Wiley, 10th Edition, 2015.

## 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. Radjarejesri et al., “Environmental Science and Engineerig” 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.

**UNIT V – QUEUE** **9**

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. JoIhe, 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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15MAT301BR | Discrete Mathematics | 3 | 2 | 0 | 4 |
| 2 | U15CS301R | Data Structures | 3 | 0 | 0 | 3 |
| 3 | U15CS302R | Digital Principles and System Design | 3 | 0 | 0 | 3 |
| 4 | U15CS303R | Object Oriented Programming using C++ | 3 | 0 | 0 | 3 |
| 5 | U15CS304R | Computer Organization and Architecture | 3 | 2 | 0 | 4 |
| | | | | | | |
| 6 | U15CS305R | Data Structures and Object Oriented Programming Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS306R | Digital Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15ENG301R | Communication Skills Laboratory | 0 | 0 | 2 | 1 |
| 9 | U15GE301R | Soft Skills and Aptitude – I | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **23** |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| **Dr.B.Sathiyabhama** | **Dr.R.Shivakumar** | **Dr.S.R.R.Senthil Kumar** |

Copy to:-
HOD/Computer Science and Engineering, Third Semester BE CSE Students and Staff, COE

**U15MAT301BR DISCRETE MATHEMATICS 3 2 0 4**

**COURSE OUTCOMES:**

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

- Construct truth tables and discuss the validity of the arguments
- Solve complicatedlogical problems
- Solve problems using lattices and Boolean algebra
- Apply the concept of functions to solve problems
- Apply the concepts of group theory and coding theory 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 form, 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, implications for quantified statements, theory of inference, the rules of universal specification and generalization, validity of arguments

**Unit – III Set Theory 15**

**Basic concepts:** Notations, subset, algebra of sets, the power set, ordered pairs and cartesian product
**Relations on sets:** Types of relations and their properties, relational matrix and graph of a relation, partitions, Equivalence relations; Partial ordering, poset, Hasse diagram, lattices and their properties; Boolean algebra, homomorphism

**Unit – IV Functions 15**

Definitions,Classification, types of functions, examples, compositions of functions, inverse functions, binary and n-ary operations, characteristic function of a set, permutation functions

**Unit – V Groups and Group Codes 15**

**Algebraic systems:** Definitions, examples, properties, semigroups, monoids, homomorphism, subsemigroups and submonoids; cosets and Lagrange's theorem, normal subgroups, Rings, (Definition and examples only), codes and group codes, basic notions of error detection and error correction

**Total: 75 hours**

**TEXT BOOK**


1. Veerarajan T, "Discrete Mathematics" 1st Edition,Tata McGraw Hill,2008
2. Rahothaman R., Ponnalagu K., "Discrete Mathematics", 5th Edition, Sonaversity, 2011


**REFERENCES**


1. Tremblay J.P., Manohar R.,"Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-hill Publishing Co. Ltd., New Delhi, 2003
2. Kenneth H.Rosen, "Discrete Mathematics with Applications", 6th Edition, TataMc- Grawhill, 2006
3. Bernard Kolman, Robert C.Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", 6th Edition, Pearson Education Pvt., Ltd., NewDelhi, 2006

**U15CS301R DATA STRUCTURES 3 0 0 3**

**COURSE OUTCOMES**

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

- Apply various non-linear tree data structures in real time applications and projects
- Solve the collision problem using hashing techniques
- Implement and solve problems using heaps
- Design algorithms to solve common graph problems
- Identify the algorithms that are used to solve various problems

**UNIT-I TREE STRUCTURE 9**

Tree: Types of Trees - Binary Tree - Representation–Tree Traversals – Expression Trees - Threaded Binary Tree - Application of Trees- Set representation – Union and Find operations.

**UNIT-II SEARCH STRUCTURES AND INDEXING 10**

Binary Search Tree- AVL Tree - Red-Black Tree- Splay Tree - B-tree - B+ tree - Hashing - Hash functions – Collision resolution techniques: Separate chaining and open addressing.

**UNIT-III HEAPS 9**

Heap – Binary Heap – Application of Heaps: Binomial Heap - Fibonacci Heap – TRIE structure.

**UNIT-IV GRAPHS 9**

Graphs: Representation – Graph traversals – Minimum spanning trees: Prim's algorithm, Kruskal's algorithm – Shortest path algorithms: Dijkstra's algorithm, Floyd Warshall algorithm – Applications of Graphs: Topological sort.

**UNIT-V INTRODUCTION TO ALGORITHM DESIGN TECHNIQUES* 8**

Overview: Greedy Method - Divide and conquer - Dynamic Programming - Backtracking - Branch and bound.

**Total: 45 hours**

*Only introductory concepts need to be taught, problem solving will be done during IV semester Design and Analysis of Algorithms course

**TEXT BOOK:**


1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Silicon Press, New Jersey, Second Edition, 2005.


**REFERENCE BOOKS:**


1. Jean Paul Tremblay and Sorenson, "An Introduction to Data Structures with Applications" McGraw Hill Publishing Company, New Delhi, Second Edition, 2007.
2. YedidyahLangsam, Moshe J Augenstein and Aaron M Tanenbaum, "Data Structures using C and C++", Prentice Hall of India/ Pearson Education, New Delhi, 2006.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, New Delhi, Second Edition, 2012.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, MIT Press, 2010.

**U15CS302R DIGITAL PRINCIPLES AND SYSTEM DESIGN 3 0 0 3**

**COURSE OUTCOMES**

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

- Illustrate different methods used for the simplification of Boolean functions
- Design combinational and sequential logic circuits
- Design and implement shift registers and counters
- Analyze memory cells and apply this organization for larger memories
- Design synchronous and asynchronous sequential circuits

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

Review of Binary Number Systems-Boolean postulates and laws-De-Morgan's theorem-principle of duality-Boolean expressions-minimization of Boolean expressions-SOP-POS - Karnaugh map minimization-don't care conditions-Quine-McCluskey. Implementation of Boolean function using logic gates.

**UNIT-II COMBINATIONAL LOGIC 9**

Design procedure-half adder and full adder- half sub tractor and full sub tractor - parallel adder/sub tractor - magnitude comparator-code conversion-BCD to excess 3code, excess 3 to BCD, Binary to Gray, Gray to binary

**UNIT-III DESIGN WITH MSI DEVICES 9**

Encoder- 8 to 3 line encoder, priority encoder, Decoder -2 to 4 line decoder, 3 to 8 line decoder-Multiplexer/Demultiplexer, Classification of memories-RAM-ROM-PROM-EPROM-EEPROM. Implementation of combinational logic using ROM, Programmable logic devices-PAL and PLA.

**UNIT- IV SEQUENTIAL LOGIC 9**

Flip flops -SR, JK, T, D– Characteristic table and equation –Application table - counters and its types– Modulo – n counter Register – shift registers- SISO, SIPO, PIPO.

**UNIT V SYNCHRONOUS ANDASYNCHRONOUS SEQUENTIAL CIRCUITS9**

Design of Synchronous counters: state diagram- State table –State minimization –State assignment, Design of asynchronous sequential machines, Race-free state assignment, Hazards, Essential hazards –Hazards elimination.

**Total: 45 Hours**

**TEXT BOOK:**


1. M.Morris Mano, "Digital Design", 5th edition, Pearson Education, 2013.


**REFERENCES**


1. Albert Paul Malvino, Donald P. Leach,"Digital principles and applications, Seventh edition, Tata McGraw-Hill,2011.
2. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
3. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007.

**U15CS303R OBJECT ORIENTED PROGRAMMING USING C++ 3 0 0 3**

**COURSE OUTCOMES**

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

- Write C++ programs using classes, objects and constructors for various applications
- Design programs for real world examples with code reusability through inheritance
- Implement polymorphism by operator overloading and virtual functions
- Write C++ programs for various applications with file handling, exception handling
- Design programs using generic programming

**UNIT-I PRINCIPLES OF OOP 10**

Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program – Applications of C++ - Tokens- Keywords- Identifiers-constants- Data types - Basic, User defined, Derived - Dynamic initialization -Reference variables- Scope resolution operator-Member dereferencing operators- memory management operators- Type casting- Function Prototyping- call by reference, return by reference- Inline function- Default arguments – Function overloading.

**UNIT-II CLASSES AND OBJECTS 12**

Class specification- Access qualifiers- Static data members and member functions - Array of objects- Objects as function arguments-Friend functions- Returning objects- Local classes - Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors- Destructors - Operator Overloading: Operator function – Overloading unary and binary operator-Overloading the operator using friend function-Type Conversion.

**UNIT-III INHERITANCE 7**

Defining Derived classes- Single Inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance-Multipath inheritance-Virtual Base Class- Abstract class- Constructors in derived and base class- Pointers- pointers to objects – this pointer - Virtual functions-Pure virtual functions.

**UNIT-IV STREAMS 8**

Stream classes- Formatted I/O- I/O Manipulators- User defined manipulators- File handling-File pointer and manipulation- Sequential and random access- Error handling.

**UNIT-V GENERIC PROGRAMMING WITH TEMPLATES 8**

Function templates, overloaded function templates, user defined template arguments, class templates - Exception Handling: Exception handling mechanism, multiple catch, nested try, rethrowing the exception – Namespaces – std namespace- Standard Template Library.

**Total : 45 Hours**

**TEXT BOOK:**


1. E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, Sixth Edition, 2013.


**REFERENCES**


1. K. R.Venugopal, Rajkumar, T.Ravishankar, “Mastering C++”, Tata McGraw Hill, 2007.
2. Robert Lafore, “Object Oriented Programming in Turbo C++”, Galgotia Publications, 2006.
3. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, Fourth Edition, 2013.
4. B.Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.
5. K.S. Easwarakumar, “ Object Oriented Data Structures Using C++”, Vikas Publication House Pvt Ltd, First Edition, 200

**U15CS304R COMPUTER ORGANIZATION AND ARCHITECTURE 3 2 0 4**

**COURSE OUTCOMES:**

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

- Demonstrate the operational concepts of computers and classify instruction set architectures
- Identify the mechanism of control signals generation in Hardwired control and micro programmed control unit
- Apply the various arithmetic operations and discuss the design of ALU
- Evaluate the performance of a pipelined processor
- Design the memory and I/O system requirements for any commercial processor.

**UNIT-I BASIC STRUCTURE OF COMPUTERS 12**

Functional units – Basic operational concepts – Bus structures – Instructions and instruction sequencing – Hardware – Software Interface – Translation from a high level language to the Hardware language-Instruction set architecture – Styles and features-Addressing modes – RISC – CISC- Amdhal's law-Performance and metrics.

**UNIT-II BASIC PROCESSING UNIT 12**

Components of the processor-Data path and control- Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control.

**UNIT-III ARITHMETIC FOR COMPUTERS 12**

Signed and Unsigned number representations - Arithmetic operations: Addition and Subtraction – Fast Adders – Binary Multiplication – Booth algorithm-Binary Division – Floating Point Numbers – Representation and operations.

**UNIT IV PIPELINING 12**

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling-Introduction to Instruction Level Parallelism

**UNIT V MEMORY AND I/O 12**

Need for a hierarchical memory system – Types and characteristics of memories – Cache memories – Improving cache performance – Virtual memory – Memory management techniques - Accessing I/O devices – Programmed Input/Output – Interrupts – Direct Memory Access – Need for Standard I/O Interfaces like PCI, SCSI, USB.

**TOTAL: 60 hours**

**TEXT BOOK:**

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

**REFERENCES**

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
4. Dr.M.Usha, T.S. Srikanth, "Computer System Architecture and Organization", Wiley Publications, 2013.
5. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education

**U15CS305R DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2**

## COURSE OUTCOMES

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

- Design programs using object oriented programming concepts in C++
- Implement recursive programs using trees, Heaps and graphs in C++
- Implement non-linear data structures for various real time applications in C++

**List of experiments based on the following topics:**

1. Classes and objects, friend functions and function overloading
2. Classes with default, parameterized, dynamic and copy constructors, destructor.
3. Overloading unary, binary operators using member functions
4. Inheritance and run time polymorphism
5. Sequential and random accessing of files.
6. Template functions and template class.
7. Exception handling mechanism.
8. Binary tree and traversal techniques.
9. Binary search tree.
10. Heaps structures.
11. Prim's and kruskal algorithm.
12. Dijkstra's algorithm
13. Hashing and collision resolution technique

**TOTAL: 45 hours**

**U15CS306R DIGITAL LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Design and implement combinational circuits using basic gates
- Design shift register using flip flop
- Design and implement synchronous and asynchronous counter

**LIST OF EXPERIMENTS**

1. Truth Table Verification of Logic Gates
2. Verification of Boolean Theorems Using Digital Logic Gates
3. Design and Implementation of Half Adder, Full Adder and Half Substractor, Full Substractor
4. Design of Code Converters -BCD to Excess 3 Code, Binary To Gray, Gray To Binary
5. Design of Multiplexer/De-Multiplexer
6. Design ofEncoder / Decoder
7. Design of Parity Checker / Generator
8. Design of Magnitude Comparator
9. Design and Implementation of Shift Registers- SISO,SIPO,PIPO
10. Design and Implementation of 3-Bit Synchronous Counters
11. Design and Implementation of 3-Bit Asynchronous Counters

**Total: 45 Hours**

| U15GE301R | SOFT SKILLS AND APTITUDE – I | 0 0 2 1 |
|---|---|---|

**COURSE OUTCOMES**

**At the end of the course, students 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**:<br>g. Attitude building<br>a. Dealing with criticism<br>b. Innovation and creativity<br>c. Problem solving and decision making<br>**d.** Public speaking<br>**e.** Group discussions |
| **2. Quantitative AptitudeandLogical Reasoning** | **Solving problems with reference to the following topics:**<br>a. Numbers: Finding units digit, Power rule<br>b. Base system – Progressions: Arithmetic, geometric and harmonic<br>c. HCF and LCM<br>d. Averages<br>e. Percentages<br>f. Ratio and proportion<br>g. Ages<br>h. Partnership<br>i. Profit and loss<br>j. Mensuration: Area, perimeter, volume and Surface area<br>k. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language<br>l. Direction Sense<br>m. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric<br>**n.** Seating arrangement |
| **3. Verbal Aptitude** | **Demonstrating English language skills with reference to the following topics:**<br>a. Verbal analogy<br>b. Tenses<br>c. Prepositions<br>d. Reading comprehension<br>e. Choosing correct / incorrect sentences<br>f. Describing pictures |

**U15ENG301R COMMUNICATION SKILLS LABORATORY 0 0 2 1**

**COURSE OUTCOMES:**

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

Communicate confidently and effectively

- Demonstrate active listening skills
- Practice soft skills and interpersonal skills to excel in their jobs.
- Use language efficiently to face interviews, participate in group discussions and present speeches.

1. **Listening Comprehension**: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. **Reading Comprehension**: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.

3. **Speaking: Phonetics**: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

4. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice

5. Creating effective PPTs – presenting the visuals effectively

6. Using appropriate body language in professional contexts – gestures, facial expressions, etc.

7. Preparing job applications - writing covering letter and résumé

8. Applying for jobs online - email etiquette

9. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD

10. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills

11. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report

12. Attending job interviews – answering questions confidently

13. Interview etiquette – dress code – body language – mock interview

**TOTAL: 30 HOURS**

**REFERENCE BOOKS**:

1. Dhanavel, S.P. 2010. English and Soft Skills. Hyderabad: Orient BlackSwan Ltd.

2. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.

3. D'Abreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.

4. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of Soft Skills. New Delhi: Pearson, 2010.

5. Gulati, Sarvesh. Corporate Soft Skills. New Delhi: Rupa and Co. 2006.

6. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.

7. Turton, N.D and Heaton, J.B. Dictionary of Common Errors, Addision Wesley Longman Ltd., Indian reprint 1998.

**EXTENSIVE READING**

1. Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Free Press,

1989.

2. Bagchi, Subroto. The Professional. New Delhi: Penguin Books India, 2009.

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

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15MAT401BR | Probability and Queuing Theory | 3 | 2 | 0 | 4 |
| 2 | U15CS403R | Database Management Systems | 3 | 0 | 0 | 3 |
| 3 | U15CS402R | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | U15CS401R | Design and Analysis of Algorithms | 3 | 2 | 0 | 4 |
| 5 | U15CS404R | Web Programming | 3 | 0 | 2 | 4 |
| **Practical** | | | | | | |
| 6 | U15CS405R | Operating Systems Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS406R | Database Management Systems Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15GE401R | Soft Skills and Aptitude – II | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **23** |

**Approved By**

**Chairperson, Computer Science and Engineering BoS**
**Dr.B.Sathiyabhama**

**Member Secretary, Academic Council**
**Dr.R.Shivakumar**

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

Copy to:-
HOD/Computer Science and Engineering, Fourth Semester BE CSE Students and Staff, COE

**U15MAT401BR PROBABILITY AND QUEUING THEORY 3 2 0 4**

**COURSE OUTCOMES**

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

- Solve simple problems using probability theory
- Apply the concepts of discrete and continuous probability distributions to solve problems
- Apply the concept of covariance, correlation and regression to solve simple problems
- Solve problems using Markov process and Poisson process
- Apply the various basic queuing models to solve problems

**UNIT I PROBABILITY AND RANDOM VARIABLE 15**

Axioms of probability, conditional probability, total probability, Bayes theorem, random variable, probability mass function, and probability density function, properties, moments

**UNIT II STANDARD DISTRIBUTIONS 15**

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

**UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15**

Joint distributions, marginal and conditional distributions, covariance, correlation and regression, transformation of random variables

**UNIT IV RANDOM PROCESSES AND MARKOV CHAINS 15**

Classification, stationary process, Markov process, Poisson process, birth and death process, Markov chains, transition probabilities

**UNIT V QUEUEING THEORY 15**

Markovian models: M/M/1, M/M/C, finite and infinite capacity, $M/M/\infty$ queues, finite source model, M/G/1 queue (steady state solutions only)

**Total: 75 hours**

**TEXT BOOKS**

1. Veerarajan T., "Probability, Statistics and Random Processes", Tata McGraw-Hill, New Delhi, 2nd Edition, 2003

2. "Probability and Queueing Theory", by Sonaversity, 2011

**REFERENCES**

1. Ross S., "A first course in probability", Pearson Education, Delhi, 6th Edition, 2002

2. Medhi J., "Stochastic Processes", New Age Publishers, New Delhi, 1994, (Chapters 2, 3, & 4)

3.Taha H. A., "Operations Research-An Introduction", Pearson Education Edition Asia, Delhi, 7th Edition, 2002

**U15CS401R DESIGN AND ANALYSIS OF ALGORITHMS 3 2 0 4**

**COURSE OUTCOMES**

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

- Analyze the algorithms that are used to solve various problems.
- Generate and solve the recurrences for divide and conquer techniques.
- Solve the problems using greedy and dynamic programming paradigms.
- Design the algorithms for solving the backtracking and transform and conquer methodologies.
- Apply the branch and bound technique to solve various problems.

**UNIT I FUNDAMENTALS OF ALGORITHM ANALYSIS 15**

Introduction - Problem solving techniques-Analysis framework – Time space tradeoff – Asymptotic notations – Conditional asymptotic notation – Properties of Big-Oh notation – Recurrence equations – Mathematical Analysis of Non-recursive algorithms - Mathematical analysis of recursive Algorithms – Analysis of linear search - Empirical analysis - Algorithm visualization

**UNIT II BRUTE FORCE AND DIVIDE AND CONQUER STRATEGIES 15**

Brute Force: Selection Sort - Bubble Sort – String matching - Exhaustive Search: Travelling Sales- man problem - Divide and Conquer: General Method – Binary Search – Closest-pair problem – Merge Sort- Quick Sort.

**UNIT III GREEDY AND DYNAMIC PROGRAMMING PARADIGMS 15**

Greedy Algorithms: General Method – Container Loading – Huffman code – Knapsack problem - Dynamic Programming: General Method – Multistage Graphs – Optimal binary search trees.

**UNIT IV BACKTRACKING AND TRANSFORM AND CONQUER METHODOLOGIES 15**

Backtracking: General Method – N-Queen's problem – Sum of subsets – Graph coloring – Hamiltonian problem. Transform and conquer : Presorting – Gaussian elimination.

**UNIT V GRAPH AND BRANCH AND BOUND STRATEGIES 15**

Graph : Connected Components – Bi-connected components – Branch and Bound: General Method (FIFO and LC) – Job assignment problem - 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness.

**Total: 75 hours**

**TEXT BOOKS**


1. Anany Levitin "Introduction to the design and Analysis of Algorithms", Pearson Education, Second Edition, 2014.


**REFERENCES**


1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Third Edition, Prentice Hall of India Pvt. Ltd, 2009.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2008.
4. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.

**U15CS402R OPERATING SYSTEMS 3 0 0 3**

**COURSE OUTCOMES**

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

- Compare the different operating system structures
- Evaluate the various process scheduling algorithms
- Design algorithms for achieving process synchronization
- Evaluate the various memory management techniques
- Analyze the effectiveness of a file system

**UNIT I INTRODUCTION AND OPERATING SYSTEM STRUCTURES 9**

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components –Operating System Services – System Calls – System Programs – System Structure – Virtual Machines – System Design and Implementation.

**UNIT II PROCESS MANAGEMENT 9**

Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication- Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - Case study – Linux Scheduling.

**UNIT III PROCESS SYNCHRONIZATION AND DEADLOCKS 9**

The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors. System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks.

**UNIT IV STORAGE MANAGEMENT AND FILE SYSTEM INTERFACE 9**

Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging - Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – Protection. Case study – Linux memory management

**UNIT V FILE SYSTEM IMPLEMENTATION AND MASS STORAGE STRUCTURE 9**

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management - Case study – Linux file system.

**Total: 45 hours**

**TEXT BOOKS**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, eighth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2012.

**REFERENCES**

1. Harvey M. Deitel, “Operating Systems”, Second Edition, Pearson Education Pvt. Ltd, 2004.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, 2014.
3. William Stallings, “Operating System”, Prentice Hall of India, 4th Edition, 2006.

**U15CS403R DATABASE MANAGEMENT SYSTEMS 3 0 0 3**

**COURSE OUTCOMES**

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

- Demonstrate the need, background, architecture and evolution of database management system and to introduce the concepts of ER model
- Design and develop relational models with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS
- Design and evaluate the normality of a logical data model, and correct any anomalies and identify the requirements of data storage and indexing techniques
- Implement query processing methodologies using various operators
- Design and develop methods for multiple transactions are managed concurrently and recovered efficiently during failures

**UNIT I INTRODUCTION 9**

**Database and Database Users:** Characteristics of database approach- Advantages of using the DBMS Approach-Database Applications.

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

**UNIT II RELATIONAL MODEL 9**

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

**SQL:** Data definition and Data type- specifying SQL constraints- Basic queries-insert-delete- update-complex queries- views- assertions and triggers- 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 Device-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 BOOKS**


1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, "Database System Concepts", Sixth Edition, McGrawHill, 2010


**REFERENCES**


1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems ", 6th Edition, Addison-Wesley, 2011
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, 2006
4. Rajesh Narang, "Database Management systems", PHI Learning pvt. Ltd, New Delhi,2006

**U15CS404R WEB PROGRAMMING 3 0 2 4**

**COURSE OUTCOMES:**

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

- Implement the concepts of java in real time application
- Develop JDBC applications
- Design and develop websites using HTML, JavaScript and CSS
- Design and develop real-time web applications using PHP and Servlet
- Build interactive web pages using XML and AJAX

**UNIT I JAVA FUNDAMENTALS 15**

Java: Overview– Variables and Arrays – Classes – Objects – Methods – Inheritance - Packages – Abstract classes – Interfaces and Inner classes

**UNIT II EXCEPTION HANDLING AND DATABASE CONNECTIVITY 15**

Exception handling - Introduction to Threads – Multithreading – String handling – Streams and I/O - Database Connectivity: JDBC perspectives, JDBC Connectivity and programs- Multi tier application.

**UNIT III CLIENTSIDE PROGRAMMING 15**

WWW Versions - HTTP - Request and Response Messages - URI, URN, URL, MIME Type - HTML - History - Versions – CSS - HTML Syntax and Semantics- Java Script: Introduction – JavaScript DOM Model - Date and Objects - Regular Expressions - Validation: Built-in objects-Event Handling- DHTML with JavaScript.

**UNIT IV SERVER SIDE PROGRAMMING 15**

Web Servers: IIS and Apache - Server Features, Server History, Server Configuration- Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server - PHP: Introduction - Variables- Program control- Built-in functions-Connecting to Database – Using Cookies.

**UNIT V AJAX and XML 15**

XML: Basic XML- Document Type Definition XML Schema DOM and Presenting XML, XML Parsers and Validation- AJAX: Ajax Client Server Architecture - XML Http Request Object - Call Back Methods

**TOTAL: 75 PERIODS**

**TEXT BOOKS**


1. Randy Connolly, Richardo Hoar, "Fundamentals of Web Development", Pearson Publications, Second Edition
2. Anita Seth, B.L. Juneja, "Java-One Step Ahead", Oxford University Press, 2017

**REFERENCES**


1. Robert W. Sebesta, Programming the World Wide Web‖, Eighth Edition, Addison-Wesley, 2015
2. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5th Edition, 2012
3. Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011
4. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009
5. Paul Dietel and Harvey Deitel, "Java How to Program", 8th Edition Prentice Hall of India
6. Gopalan N.P. and Akilandeswari.J, "Web Technology", Prentice Hall of India, 2011.
7. https://www.w3schools.com/

**U15CS405R OPERATING SYSTEMS LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Simulate various Unix commands using shell scripts
- Design, develop and demonstrate various page replacement policies and memory management techniques
- Design and develop an deadlock avoidance algorithm

**(Implement the following on LINUX platform. Use C for high level language implementation)**

**LIST OF EXPERIMENTS**

1. UNIX - Basic Commands.
2. Shell programming (Using looping, control constructs etc.,)
3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Implementation of CPU scheduling algorithms: FCFS, SJF, Round Robin & Priority Scheduling.
7. Implementation of the Producer – Consumer problem using Semaphores.
8. Implementation of Banker's algorithm.
9. Implementation of memory management schemes (First fit, Best fit & Worst fit)
10. Implement page replacement algorithms (FIFO & LRU)

**Total: 60 hours**

**U15CS406R DATABASE MANAGEMENT SYSTEMS LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Design schema for the given database by creating appropriate tables and write SQL queries using DDL and DML statements to retrieve information out of it.
- Create views and triggers that automatically indicate the updating of data in the tables
- Apply the concept of databases to the real time application development

**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. Working with triggers
7. Use of front end tools to manipulate the database
8. Menu Design
9. Generate reports using a reporting tool
10. Database Design and implementation of an application system. (Suggested Mini Project)

**Total: 60 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:**<br>a. SWOT<br>b. Goal setting<br>c. Time management<br>d. Stress management<br>e. Interpersonal skills and Intrapersonal skills<br>f. Presentation skills<br>g. Group discussions |
| **2. Quantitative Aptitude and Logical Reasoning** | **Solving problems with reference to the following topics:**<br>a. Allegation and mixture<br>b. 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<br>c. Clocks<br>d. Calendars<br>e. Blood relations<br>f. Cubes and Dices<br>g. Syllogism (≤3 statements)<br>h. Ranking and order<br>i. Company specific aptitude questions |
| **3. Verbal Aptitude** | **Demonstrating English language skills with reference to the following topics:**<br>a. Critical reasoning<br>b. Theme detection<br>c. Verbal analogy<br>d. Prepositions<br>e. Articles<br>f. Cloze test<br>g. Company specific aptitude questions |

S. Anita

**Dr.S.Anita**

Department of Placement Training
Sona 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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15CS501R | Software Engineering | 3 | 0 | 0 | 3 |
| 2 | U15CS502R | Computer Networks | 3 | 0 | 0 | 3 |
| 3 | U15CS503R | Embedded Systems Design | 3 | 0 | 0 | 3 |
| 4 | U15CS504R | Theory of Computation | 3 | 0 | 0 | 3 |
| 5 | U15CS902R | **Elective –** Multimedia System | 3 | 0 | 0 | 3 |
| | U15CS904R | **Elective –** Data Warehousing and Data Mining | | | | |
| **Practical** | | | | | | |
| 6 | U15CS505R | Computer Networks Laboratory | 0 | 0 | 4 | 2 |
| 7 | U15CS506R | Python Programming Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15GE501R | Soft Skills and Aptitude – III | 0 | 0 | 2 | 1 |
| 9 | U15ENG501R | Professional Communication Skills Laboratory | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **21** |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| **Dr.B.Sathiyabhama** | **Dr.R.Shivakumar** | **Dr.S.R.R.Senthil Kumar** |

Copy to:-

HOD/Computer Science and Engineering, Fifth Semester BE CSE Students and Staff, COE

**U15CS501R SOFTWARE ENGINEERING 3 0 0 3**

**COURSE OUTCOMES**

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

- Compare and analyze the various lifecycle models of software process
- Design an appropriate analysis model that suits the requirement
- Design software architecture models for various applications
- Implement the strategies for software testing
- Estimate the cost of the project using appropriate methods

**UNIT I SOFTWARE PROCESS 9**

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented and Agile software project management model) - system engineering – computer based system – verification – validation.

**UNIT II SOFTWARE REQUIREMENTS 9**

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

**UNIT III DESIGN CONCEPTS AND PRINCIPLES 9**

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design– user interface design – user interface design principles. Real time systems - Real time software design. Software Configuration Management (SCM) – Need for SCM – Version control – Introduction to SCM process – Software configuration items - software design with extreme programming – Risk Management.

**UNIT IV TESTING 9**

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

**UNIT V SOFTWARE PROJECT MANAGEMENT 9**

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes – program evolution dynamics – software maintenance – Architectural evolution.

**Total: 45 hours**

**TEXT BOOK**

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition,2015.

**REFERENCES**

1. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition, 2011.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996

**U15CS502R COMPUTER NETWORKS 3 0 0 3**

**COURSE OUTCOMES**

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

- Identify the suitable network services for the given network applications
- Apply transport layer services using TCP or UDP protocols
- Design the network layer packet delivery using appropriate routing algorithms
- Analyze the various functionalities of data link layer
- Demonstrate the key concepts and functions of physical layer

**UNIT I INTRODUCTION AND APPLICATION LAYER 9**

The Internet – Protocol – The network edge – ISPs and Internet backbones – Protocol layers and their service models. Network applications – The Web and HTTP – FTP – SMTP – DNS – SNMP.

**UNIT II TRANSPORT LAYER 9**

Connectionless transport **–** User Datagram Protocol – Connection Oriented transport – Transmission Control Protocol – Congestion control – TCP congestion control – Introduction to Quality of Service.

**UNIT III NETWORK LAYER 9**

Circuit Switching – Packet Switching – Virtual Circuit and Datagram Networks – The Internet protocol (IP) – Datagram format – IPv4 addressing– Sub netting – ICMP – Ipv6 – Routing algorithms – Link State Routing – Distance Vector Routing – RIP – OSPF – BGP – Multicast – IGMP.

**UNIT IV DATA LINK LAYER 9**

Error-Detection and -Correction Techniques - Framing - Flow Control and Error control protocols (Simple - STOP and WAIT - Go Back-N ARQ - Selective Repeat ARQ - Piggybacking) **–** Media access protocols – Channel partitioning protocols – Random access protocols – Link layer addressing – ARP – Ethernet – Token Ring – Switches – Wireless LAN.

**UNIT V PHYSICAL LAYER**

Data and signals – Performance – Multiplexing – Transmission media. **9**

**Total: 45 hours**

**TEXT BOOK:**

1. James F. Kurose, K. W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, 7th Ed, Addison-Wesley, 2017.

**REFERENCES:**


1. Behrouz A.Ferouzan,"Data Communications and Networking", Fifth Edition, Tata McGraw-Hill Publication, 2013.
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
3. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.
4. Andrew Tanenbaum, Computer Networks, Prentice Hall of India, fifth edition, 2010
5. Douglas E. Comer, "Computer Networks and Internets with Internet Applications", Fifth Edition, Pearson Education, 2009

**U15CS503R EMBEDDED SYSTEM DESIGN 3 0 0 3**

**COURSE OUTCOMES**

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

- Describe the architecture of 8 bit and 16 bit microprocessors
- Analyze the functionality of each block in 8051 microcontroller
- Design an electronic system using PIC microcontroller
- Analyze hardware and software architecture of any embedded systems
- Develop an embedded system using development boards

**UNIT I Embedded System Concepts 9**

Introduction to embedded system-Application areas-categories of embedded systems-Overview of embedded system architecture- Specialties of embedded systems-Recent trends in embedded systems-Hardware architecture of embedded systems.

**UNIT II Design of Embedded Systems 9**

Hardware design-Selection of processor-Software design- -Implementation-Integration and testing-Types of testing-Types of Hardware Platforms-Hardware description of AVR microcontroller development and its features-Introduction to RTOS –Architecture of the kernel-Scheduling Algorithms-FIFO-Round Robin-Shortest job first

**UNIT III 8 bit and 16 bit Microprocessors 9**

8085 architecture- Signal diagram- instruction set- addressing modes- interrupts -8086- architecture – Signal diagram – Arithmetic and logical instructions-addressing modes -memory segmentation

**UNIT IV 8 bit Embedded Controller 9**

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts.

**UNIT V PIC Embedded Controller 9**

PIC 16C61 / 71 microcontroller architecture – FSR – Reset action – Oscillatory connections – Memory organizations- Instructions-Addressing modes-I/O ports-Interrupts-Timers-ADC in PIC 16C61 / 71 microcontroller.

**Total: 45 hours**

**TEXT BOOKS:**


1. Senthil Kumar N,Saravanan M ,Jeevananthan S “Microprocessors and Microcontrollers” 2nd Edition – Oxford University Press.2018,
2. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dreamtech press, 2016.
3. Ajay V Deshmukh, “Microcontrollers [Theory and Applications]”, McGrawHill,2017.

**REFERENCES:**


1. Soumitra Kumar Mandal , “Microprocessors and Microcontrollers, Architecture, Programming and Interfacing using 8085, 8086 and 8051”, McGrawHill Companies,2017
2. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and application with 8085”, 4th Edition, Penram International Publishing, New Delhi, 2000.
3. Dougles V.Hall, “Microprocessor and Interfacing”, Programming and Hardware, Tata McGraw-Hill, 2017.
4. Shibu K V, “Introduction to Embedded Systems”, McGraw Hill, 2009.
5. Raj Kamal “Embedded Systems Architecture Programming and Design” 2nd Edition TMH, 2010.

**U15CS504R THEORY OF COMPUTATION 3 0 0 3**

**COURSE OUTCOMES**

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

- Compare and analyze various Finite Automata and convert NFA to DFA
- Construct finite automata to regular expression and identify the properties of regular language
- Design grammars and recognizers for different formal languages and design PDA
- Convert CFG to normal forms and design turing machines for various problems
- Determine the decidability and intractability of computational problems

**UNIT I AUTOMATA 9**

Introduction to formal proof − Additional forms of proof − Inductive proofs – Finite Automata (FA) − Deterministic Finite Automata (DFA) − Non- deterministic Finite Automata (NFA) − Finite automata with epsilon transitions. Case Study: Cruise Control

**UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9**

Regular expression − FA and Regular expressions − Proving languages not to be regular − Closure properties of regular languages − Equivalence and minimization of automata.

**UNIT III CONTEXT-FREE GRAMMAR AND LANGUAGES 9**

Context Free Grammar (CFG) − Parse trees − Ambiguity in grammars and languages − Definition of the pushdown automata − Languages of a pushdown automata − Equivalence of pushdown automata and CFG − Deterministic pushdown automata.

**UNIT IV TURING MACHINE 9**

Normal forms for CFG − Pumping lemma for CFL − Closure properties of CFL −Turing machines − Programming Techniques for TM. Case study: Church's Thesis-Godelization.

**UNIT V UNDECIDABILITY 9**

Recursively Enumerable (RE) - An Undecidable problem that is RE – Halting Problem− Post's correspondence problem −Classes P and NP –NP Completeness-Relationship between Time Complexity and Space Complexity.

**Total: 45 hours**

**TEXT BOOKS:**


1. Hopcroft, J.E. Motwani, R. and Ullman, J.D "Introduction to Automata Theory, Languages and Computations", 2nd Edition, Pearson Education, 2013


**REFERENCES:**


1. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997
2. Martin, J., "Introduction to Languages and the Theory of Computation", 3rd Edition, TMH, 2003.
3. Lewis, H. and Papadimitriou, C.H "Elements of the Theory of Computation", 2nd Edition, Pearson Education/PHI, 2003.
4. Greenlaw, "Fundamentals of Theory of Computation, Principles and Practice", Elsevier, 2008.

**U15CS902R MULTIMEDIA SYSTEMS 3 0 0 3**

**COURSE OUTCOMES**

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

- Design multimedia contents using texts, hypermedia and hypertext
- Design multimedia contents using sound, images, animation and video
- Compare the various image/video compression techniques
- Analyze the various hardware and software tools used in multimedia systems
- Design web pages with multimedia contents

**UNIT I INTRODUCTION TO MULTIMEDIA 9**

Introduction to making Multimedia- Multimedia Skills and training- Text: Using text in Multimedia- Computer and Text- Font Editing and Design Tools- Hypermedia and Hypertext.

**UNIT II MULTIMEDIA FILE HANDLING 9**

Sounds-Recording, Processing and Editing sounds using digital audio, audio file formats-Images-bitmap, vector and 3D images, Capabilities and Limitations, Animation- Cel and Computer Animation, Animation file types, Video- digital video containers, Codecs, Shooting and editing video.

**UNIT-III DIGITAL VIDEO AND IMAGE COMPRESSION 9**

Evaluating a compression system - Redundancy and visibility-Video compression techniques- Standardization of an algorithm - The JPEG image compression standard- ITU –T Standards – MPEG motion video compression standard-DVI Technology.

**UNIT IV HARDWARE AND SOFTWARE TOOLS 9**

Multimedia Hardware: Macintosh and Windows production platforms-Hardware Peripherals: Memory and Storage Devices, Input Devices, Output Devices, Communication Devices .Basic Software Tools.

**UNITV MULTIMEDIA AND INTERNET 9**

Internetworking –connections -Internet services -Tools for WWW - Designing WWW.

**Total: 45 Hours**

**TEXTBOOKS:**


1. Tay Vaughan, "Multimedia: Making It Work", 7th Edition, Tata Mc-Grawhill,2014. (Unit I, II, IV and V)
2. John F.Koegel Buford, "Multimedia Systems", Pearson Education ,Sixth Edition,2009. (unit III)


**REFERENCES:**


1. Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson Education,2009.
2. Ze-Nian Li, Mark S Drew and Jiangchuan Liu, "Fundamentals of Multimedia", Second Edition, Springer, 2014
3. David Hillman, "Multimedia – Technology and applications",Galgotia Publications, Delhi, 2008

**U15CS904R DATA WAREHOUSING AND DATA MINING 3 0 0 3**

**COURSE OUTCOMES**

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

- Apply OLAP operations to query processing in data mining and evolve multidimensional models from a typical system
- Analyze various preprocessing techniques to improve data quality
- Identify the knowledge imbibed in the high dimensional system using different classification methods
- Apply clustering to discover the hidden interesting patterns from massive data
- Solve issues in emerging areas using mining techniques

**UNIT I DATA WAREHOUSE PROCESS AND CHITECTURE 9**

Evolution of Decision Support Systems-–Building a Data warehouse- Data Warehouse and DBMS- Data marts-Metadata, Multidimensional data model, OLAP operations- Data cubes-Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations. Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation – Introduction to business intelligence- BI tools

**UNIT II INTRODUCTION TO DATA MINING CONCEPTS 9**

Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Issues, Data preprocessing – Data cleaning-Integration-transformation and reduction- Discretization and generating concept hierarchies- Data Generalization And Summarization Based Characterization -Mining frequent patterns- association-correlation -Installation of WEKA tool- Experiments with Weka – filters-discretization

**UNIT III CLASSIFICATION AND PREDICTION 9**

Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation - Lazy Learners – Other Classification Methods- Prediction- Evaluating classifier accuracy-Ensemble methods. Experiments with Weka generating rule and decision tree.

**UNIT IV CLUSTERING 9**

Clustering techniques –Partitioning methods- k-Means and k-Medoids- Hierarchical Methods – agglomerative and divisive clustering–Grid Based Methods – Model Based Clustering Methods - Expectation Maximization – Constraint based Cluster Analysis – Outlier Analysis -Experiments with Weka – k-Means and Expectation Maximization

**UNIT V DATA WAREHOUSING AND DATA MINING APPLICATIONS 9**

Mining complex data objects-Spatial databases- temporal databases- Multimedia databases- Time series and Sequence data; Text Mining –Graph mining-web mining-Application and trends in data mining

**Total: 45 hours**

**TEXT BOOKS:**

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition 2011, ISBN: 1558604898.

**REFERENCES:**


1. Mehmed kantardzic,"Datamining concepts, models, methods, and algorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques, third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall, 2003.
4. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMc Graw Hill Edition, Tenth Reprint 2007.
5. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
6. www.cs.waikato.ac.nz/ml/weka/

**U15CS505R COMPUTER NETWORKS LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Implement the functionalities of various network protocols
- Simulate the network protocols using ns-2
- Analyze the performance of network protocols using Wire shark

**LIST OF EXPERIMENTS:**

1. Simulation of HTTP protocol using TCP Socket
2. Programs using TCP Sockets (like getting date and time from server, Chat application, etc...)
3. Programs using UDP sockets (like simple DNS)
4. Programs using RMI
5. Simulation of Error Correction Code ( like CRC)
6. Learn to use commands like TCP Dump, Netstat, Trace Route
7. Simulation of PING using Raw Sockets
8. Network topology configuration using ns2
9. Performance comparison of Distance Vector Routing and Link State Routing algorithms in ns-2
10. Study of UDP/TCP performance using ns-2
11. Simulation of wireless network using ns-2
12. Packet sniffing using WIRESHARK application.

**Total: 45 hours**

## U15CS506R PYTHON PROGRAMMING LABORATORY 0 0 4 2

**Course Outcomes:**

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

- Develop Python programs to implement basic concepts
- Develop Python programs to implement advanced concepts
- Develop Python programs for database handling

**List of Experiments:**

1. Write a Python program to print the calendar of a given month and year.
2. Write a Python program to count the number 5 in a given list of numbers.
3. Write a Python program to remove and print every second number from a list of numbers until the list becomes empty.
4. Write a Python program to get a single string from two given strings, separated by a space and swap the first two characters of each string. Sample String: 'Python' 'Java', Output String: 'Jython' ' Pava'.
5. Write a Python function to check whether a string is a pangram or not. (Note: Pangrams are words or sentences containing every letter of the alphabet at least once. For example: "The quick brown fox jumps over the lazy dog").
6. Write a Python program to check whether an element exists within a tuple.
7. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples. Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)], Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)].
8. Write a Python program to check whether an element exists within a tuple.
9. Write a Python script to check if a given key already exists in a dictionary.
10. Write a Python function that accepts a string and calculate the number of upper case letters and lower case letters .*Sample String:* 'Sona College of Technology' , *Expected Output:* No. of Upper case characters: 3 No. of Lower case Characters: 20.
11. Write a Python program to find the greatest common divisor (gcd) of two integers using recursion.
12. Write a Python program to combine each line from first file with the corresponding line in second file.
13. Write a Python program to implement the concept of inheritance.
14. Write a Python class to find validity of a string of parentheses, '(', ')', '{', '}', '[' and ']. These brackets must be close in the correct order, for example "()" and "()[]{}" are valid but "[)", "({[)]" and "{{{" are invalid.
15. Write a Python program to execute SQL queries like create, insert, delete, update and select in any of the database like MySQL, SQLite etc.

**Total :45 Hours**

**U15ENG501R PROFESSIONAL COMMUNICATION SKILLS LABORATORY 0 0 2 1**

**COURSE OUTCOMES**

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

- Construct sentences without grammatical mistakes
- Listen effectively and communicate confidently
- Face interviews, make presentations on technical topics and take part in group communication confidently
- Read and comprehend technical texts and general articles
- Develop effective passages / articles on technical topics

**UNIT-I FUNCTIONAL GRAMMAR AND VOCABULARY FOR ENGINEERS 4**

Introduction to grammar- different approaches - concord – preposition – tenses – remedial grammar – technical terms in computer science and engineering – words that are often used wrongly – vocabulary base.

**UNIT-II LISTENING – FOUNDATION OF LANGUAGE SKILLS 3**

Listening to lectures on technical topics and motivational speeches – making notes on audio and video lessons – interpreting the implied meaning.

**UNIT-III SPEAKING – ESSENTIAL PEOPLE SKILLS 8**

Participating in interviews – organizing a presentation and preparing effective slides - developing content for presentation - group presentation.

**UNIT-IV READING – AN IMPERATIVE RECEPTIVE SKILL 3**

Reading technical articles and discussing - reading inspirational literature for intrinsic motivation and personality development – reading for academic and general purposes.

**UNIT-V WRITING – AN INDISPENSIBLE COMMUNICATION SKILL 7**

Describing processes and objects - constructing effective paragraphs on technical topics – developing general essays on current affairs and technical articles on scientific advancements.

**Total: 25 hours**

| 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:**<br>a. Career planning<br>b. Resume writing<br>c. Group discussion<br>d. Teamwork<br>e. Leadership skills<br>f. Interview skills<br>g. Mock interview<br>**h.** Mock GDs |
| **2.Quantitative Aptitude and Logical Reasoning Topics** | **Solving problems with reference to the following topics :**<br>a. Numbers: Remainder concept<br>b. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule<br>c. Simple interest<br>d. Compound interest<br>e. Set theory: Venn diagram<br>f. Puzzles<br>g. Mathematical operators<br>h. Syllogism (≥4 Statements)<br>i. Data sufficiency<br>j. Statement and assumptions<br>k. Statement and conclusions<br>**l.** Company specific aptitude questions |
| **3. Verbal Aptitude** | **Demonstrating English language skills with reference to the following topics:**<br>a. Subject verb agreement<br>b. Selecting the best alternative for the stated parts of given sentences<br>c. Reading comprehension<br>d. Contextual synonyms<br>e. Sentence fillers<br>f. Writing a story for a given picture<br>**g.** Company specific aptitude questions |

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: Computer Science and Engineering**

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit |
|---|---|---|---|---|---|---|
| **Theory** | | | | | | |
| 1 | U15GE602AR | Principles of Management | 3 | 0 | 0 | 3 |
| 2 | U15CS601R | Principles of Compiler Design | 3 | 0 | 0 | 3 |
| 3 | U15CS602R | Internet of Things | 3 | 0 | 0 | 3 |
| 4 | U15CS919R | **Elective –** Software Project Management | 3 | 0 | 0 | 3 |
| 5 | noc21-cs35 | **Elective –** Deep Learning –IIT Ropar | 3 | 0 | 0 | 3 |
| **Open Elective** | | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 |
| | U15CE1003R | Energy Efficiency and Green Building | | | | |
| | U15CE1004R | Municipal Solid Waste Management | | | | |
| | U15EE1006R | Renewable Energy Systems | | | | |
| | U15FT1001R | Fundamentals of Fashion Design | | | | |
| | U15ME1002R | Renewable Energy Sources | | | | |
| | U15EC1006R | Sensors and Smart Structures Technologies | | | | |
| | U15EE1001R | Electric Mobility | | | | |
| | U15ME1004R | Industrial Safety | | | | |
| **Practical** | | | | | | |
| 7 | U15CS603R | Compiler Design Laboratory | 0 | 0 | 4 | 2 |
| 8 | U15CS604R | Internet of Things Laboratory | 0 | 0 | 4 | 2 |
| 9 | U15CS605R | Creative and Innovative Project | 0 | 0 | 2 | 1 |
| 10 | U15GE601BR | Soft Skills and Aptitude – IV | 0 | 0 | 2 | 1 |
| | | | | | **Total Credits** | **24** |

**Approved By**

**Chairperson, Computer Science and Engineering BoS** **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
**Dr.B.Sathiyabhama** **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

**Copy to:-**

HOD/Computer Science and Engineering, Sixth Semester BE CSE Students and Staff, COE

**U15GE602AR PRINCIPLES OF MANAGEMENT 3 0 0 3**

COURSE OUTCOMES

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

- Identify the organizational factors and roles of Management
- Apply planning, forecasting and decision making in real time applications
- Apply the concepts of organizing in an organization
- Analyze the concepts of delegation of authority and Organization culture.
- Apply the concepts of controlling in an organization

UNIT IINTRODUCTION 9

Definitions of Management-Scope of Management-Levels of Management-Functions and Roles of a manager-Evolution of Management thought-Organisation and Environmental Factors-Forms of Business Organizations-Corporate Social Responsibility-recent trends and challenges in global management scenario.

UNIT II PLANNING 9

Definition of Planning-Nature and purpose of planning-Planning process-Types of plans-Objectives-Management of objective(MBO)-Management by exception-Types of strategies-Decision Making: definition and process-Types of managerial decision-group decision making techniques-Decision making under different conditions-forecasting and its techniques.

UNIT III ORGANISING 9

Definition of organizing-Nature and purpose of organizing-Formal and informal organizations-organization charts-Organization structures-Span of control-factors determining effective span-line and staff authority-Departmentation-Centralization and Decentralization-Delegation of authority-staffing-selection and recruitment-Orientation-Training and development-Performance Appraisal-organization change-Staffing

UNIT IV DIRECTING 9

Directing: nature and purpose-Motivation and Satisfaction-Motivation theories-job enrichment-definition of leadership-elements of leadership-Leadership styles-leadership theories-Communication-process and barriers to effective communication-Organization culture-Elements and types of culture-Managing cultural diversity.

UNIT V CONTROLLING 9

Process of controlling-Types of control-Budgetary and non-budgetary control techniques- MIS-Managing productivity-Constant control-purchase control- Maintenance control-quality control-planning operations-performance standards-Measurement of performance-Remedial actions.

**Total :45 hours**

**TEXT BOOKS**


1. Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th Edition, 2004.

**REFERENCES**


1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999

**U15CS601R PRINCIPLES OF COMPILER DESIGN 3 0 0 3**

COURSE OUTCOMES

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

- Construct the various phases of compiler using compiler construction tools
- Design and implement a lexical analyzer
- Design and analyze various top down and bottom up parsers
- Generate the Intermediate Languages for code generation
- Design and analyze code generation schemes and optimized compilers

UNIT IINTRODUCTION TO COMPILERS 7

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

UNIT II LEXICAL ANALYSIS 9

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

UNIT III SYNTAX ANALYSIS 10

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

UNIT IV SYNTAX DIRECTED TRANSLATION & INTERMEDIATE CODE GENERATION 9

Syntax directed Definitions- Run-Time Environments- Storage Organization-Storage Allocation Strategies-Symbol Tables-Intermediate Code Generation – Intermediate languages – Declarations – Assignment Statements-Boolean expressions – Case statements- Backpatching - Procedure calls.

UNIT V CODE OPTIMIZATION AND CODE GENERATION 10

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

Case Study: Single pass and two pass compilers.

**Total : 45 hours**

**TEXTBOOKS**

1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, “Compilers – Principles, Techniques and Tools”, 2nd Edition, Pearson Education, 2014.

**REFERENCES**


1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, “Advanced Compiler Design and Implementation, “Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004. 4. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2008.

**U15CS602R INTERNET OF THINGS 3 0 0 3**

COURSE OUTCOMES

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

- Describe the characteristics, physical and logical designs, domains and architecture
- Differentiate M2M and IoT, SDN and NFV design methodologies
- Identify the various IoT elements appropriate to the applications
- Design a portable IoT using Arduino/Raspberry Pi incorporating cloud and analytics
- Implement IoT applications for real-time environment

UNIT I FUNDAMENTALS OF IoT 9

Introduction - Definition and Characteristics of IoT - Physical design - IoT Protocols - Logical design - IoT communication models, IoT Communication APIs - Enabling technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs - IoT Architectural view

UNIT II M2M AND IoT DESIGN METHODOLOGY 9

IoT and M2M- difference between IoT and M2M - Software Defined Networks - Network Function Virtualization - IoT systems management – Needs - NETCONF, YANG - IoT design methodology

UNIT III ELEMENTS OF IoT 9

Sensors and actuators - Communication modules – Zigbee - LoRa - RFID - Wi-Fi - Power sources

UNIT IV BUILDING IoT WITH CLOUD AND DATA ANALYTICS 9

IoT platforms – Arduino – Raspberry Pi - Cloud Computing in IoT - Cloud Connectivity - Big Data Analytics - Data Visualization

UNIT V CHALLENGES IN IOT AND CASE STUDIES 9

Security Concerns and Challenges - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation

**Total: 45 hours**

**TEXT BOOKS**


1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key applications and Protocols”, Wiley Publications 2nd edition , 2013


**REFERENCES**


1. Raj Kamal, “Internet of Things – Architecture and Design Principles”, Mc Graw Hill Education Pvt. Ltd., 2017
2. Internet of Things and Data Analytics, Hwaiyu Geng, P.E, Wiley Publications, 2017
3. Manoel Carlos Ramon, ―Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers‖, Apress, 2014
4. Marco Schwartz, ―Internet of Things with the Arduino Yun‖, Packt Publishing, 2014
5. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012

**U15CS919R SOFTWARE PROJECT MANAGEMENT 3 0 0 3**

COURSE OUTCOMES

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

- Explore the roles of the project manager and opportunities in project management
- Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities
- Apply best practices to develop competencies and skills in planning and controlling projects to ensure successful outcomes
- Analyze the scheduling resources using various models
- Identify suitable project management techniques for the managers.

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT 9

Project Definition – Contract Management – Activities Covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning.

UNIT II PROJECT EVALUATION 9

Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation – Software effort Estimation

UNIT III ACTIVITY PLANNING 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.

UNIT IV MONITORING AND CONTROL 9

Resource allocation - identifying and scheduling resources – publishing resource and cost schedule – scheduling sequence - Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behavior - Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

**Total: 45 hours**

**TEXT BOOKS**

1. Bob Hughes, Mikecotterell, “Software Project Management”, Fifth Edition,Tata McGraw Hill, 2010.

**REFERENCES**


1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2006.
2. Royce, “Software Project Management”, Pearson Education, 2005.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.
4. Robert T. Futrell, Donald F. Shefer and Linda I. Shefer, “Quality Software Project Management”, Pearson Education, 2006

**U15CS603R COMPILER DESIGN LABORATORY 0 0 4 2**

COURSE OUTCOMES

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

- Construct NFA and minimized DFA from a given regular expression using C program.
- Use LEX and YACC tool to implement a lexical analyzer and parser for the grammar
- Generate a code for a given intermediate code

LIST OF EXPERIMENTS

1. Construction of NFA.
2. Construction of minimized DFA from a given regular expression.
3. Use LEX tool to implement a lexical analyzer.
4. Use YACC and LEX to implement a parser for the grammar.
5. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.
6. Construction of operator precedence parse table.
7. Implementation of symbol table
8. Implementation of shift reduced parsing algorithms.
9. Construction of LR parsing table.
10. Generation of code for a given intermediate code.
11. Implementation of code optimization techniques.

**Total: 60 hours**

**U15CS604R INTERNET OF THINGS LABORATORY 0 0 4 2**

COURSE OUTCOMES

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

- Design a simple Internet of Things (IoT) application using Arduino/Raspberry Pi, sensors and actuators
- Deploy an IoT application using Arduino/Raspberry Pi and appropriate sensor and actuator
- Build an IoT system using mobile app as a mini project

LIST OF EXPERIMENTS

1. Turn ON and OFF the LEDs.
2. Identify the objects using IR and PIR sensor.
3. Measure the moisture level of soil using soil moisture sensor.
4. Measure the distance between the ultrasonic sensor and the obstacle.
5. Identify the leakage of gas/smoke in the environment.
6. Measure the humidity and moisture value of the environment.
7. Control a LED using relay switch.

MINI PROJECT

8. Build an IoT system for the following suggested titles but not limited to:
9. Line follower robot
10. Smart weather monitoring system
11. Smart lighting system
12. Smart waste management system
13. Smart parking system

**Total: 60 hours**

**U15CS605R CREATIVE AND INNOVATIVE PROJECT 0 0 2 1**

COURSE OUTCOMES

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

- Identify and specify the pre-processing necessary to solve a problem
- Suggest optimum solutions by comparing the different solutions from an algorithmic perspective
- Apply the result implications in any societal problem

INTERNALS

a. First Review
   I. Block Diagram of the proposed solution for a societal / creative problem
   II. New Contribution in terms of modifications to existing algorithm or suggestion of new ones
   III. Detailed Design of each module
   IV. Evaluation Metrics
   V. Test Cases

b. Second Review
   I. Implementation - Justifying pros and Cons
   II. Coding - highlighting what has been reused and what is being written

c. Third Review
   I. Test Runs ii. Performance Evaluation based on Metrics iii. Project Documentation

EXTERNALS

- Presentation, Viva-Voce, Report submission

**Total: 30 hours**

# DEEP LEARNING - PART 1(IIT ROPAR)

**PROF. SUDARSHAN IYENGAR**
Department of Computer Science and Engineering
IIT Ropar

TYPE OF COURSE : Rerun I Elective I UG/
COURSE DURATION : 12 weeks (18 Jan' 21 - 9 Apr' 21)
EXAM DATE : 25 Apr 2021

**PRE-REQUISITES :** Working knowledge of Linear Algebra, Probability Theory. It would be beneficial if the participants have done a course on Machine Learning.

**INTENDED AUDIENCE :** Any Interested Learners

**COURSE OUTLINE :**
Deep Learning has received a lot of attention over the past few years and has been employed successfully by companies like Google, Microsoft, IBM, Facebook, Twitter etc. to solve a wide range of problems in Computer Vision and Natural Language Processing. In this course we will learn about the building blocks used in these Deep Learning based solutions. Specifically, we will learn about feedforward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms. We will also look at various optimization algorithms such as Gradient Descent, Nesterov Accelerated Gradient Descent, Adam, AdaGrad and RMSProp which are used for training such deep neural networks. At the end of this course students would have knowledge of deep architectures used for solving various Vision and NLP tasks

**ABOUT INSTRUCTOR :**
Sudarshan Iyengar has a PhD from the Indian Institute of Science and is currently working as an Assistant Professor at IIT Ropar and has been teaching this course from the past 4 years.

**COURSE PLAN :**

**Week** 1: History of Deep Learning, Deep Learning Success Stories, McCulloch Pitts Neuron

**Week** 2: Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Gradient Descent

**Week** 3: Feed Forward Neural Networks, Back propagation

**Week** 4: Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD

**Week** 5: Principal Component Analysis and its interpretations, Singular Value Decomposition

**Week** 6: Auto encoders and relation to PCA, Regularization in auto encoders, Denoising auto encoders, Sparse auto encoders

**Week** 7: Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation

**Week** 8: Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Batch Normalization

**Week** 9: Learning Vectorial Representations Of Words

**Week** 10: Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet

**Week** 11: Recurrent Neural Networks, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs

**Week** 12: Encoder Decoder Models, Attention Mechanism, Attention over images

| Semester –VI | U15 GE 601B R: SOFT SKILLS AND APTITUDE – IV<br>(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:**<br>a. Mock group discussions<br>b. Mock interviews<br>c. Mock stress interviews |
| **2. Quantitative Aptitude and Logical Reasoning** | **Solving problems with reference to the following topics:**<br>a. Crypto arithmetic problems<br>b. Permutation & Combination<br>c. Probability<br>d. Clocks & Calendars<br>e. Functions & polynomials<br>f. Logarithm<br>g. Geometry<br>h. Puzzles<br>i. Data interpretation<br>j. Data Sufficiency<br>k. Company specific aptitude questions (AMCAT & Co cubes) |
| **a. 3. Verbal Aptitude** | **Demonstrating English language skills with reference to the following topics:**<br>a. Writing captions for given pictures<br>b. Reading comprehension<br>c. Critical reasoning<br>d. Theme detection<br>e. Jumbled sentences<br>f. Writing a story on given pictures<br>g. Company specific aptitude questions |

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

CSE

**U15CS1003R** **INTERNET OF THINGS** **3 0 0 3**

PREAMBLE

The “Internet of Things” (IoT) is the network of physical objects or "things" embedded with sensors, actuators, software, electronics and network connectivity to enable it to achieve greater value and service by exchanging data between the physical world and computer systems over existing network infrastructure. By connecting everyday real world objects such as transports, buildings and industrial equipments, IoT guarantees to revolutionize how we live and work. In the year 2020, it is estimated that approximately 30 billion devices will be connected in IoT. IoT will drive new consumer and business behavior that will demand increasingly intelligent industry solutions. It can also help various industries like agriculture, health services, energy, security, disaster management etc., which need to automate solutions to problems faced through remotely connected devices.

The Internet of Things involves three distinct stages:

1. The sensors which collect data (including identification and addressing the sensor/device)

2. An application which collects and analyzes this data for further consolidation

3. Decision making and the transmission of data to the decision-making server. Analytical engines, actuators and Big data may be used for the decision making process.

After completing the course the students will attain the following,

- Ability to build real time IoT applications by interfacing the sensors with minimal programming.
- Ability to associate sensor networks and communication modules for building IoT systems.

**U15CS1003R INTERNET OF THINGS 3 0 0 3**

COURSE OUTCOMES:

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

- Recall characteristics, physical and logical designs, domains.
- Differentiate IoT and M2M and explain IoT design methodology.
- Describe the various IoT components.
- Design a portable IoT system using Arduino/Raspberry Pi.
- Discuss the various applications of IoT.

UNIT I FUNDAMENTALS OF IOT 9

Introduction-Definition and Characteristics of IoT- Physical design- IoT Protocols-Logical design - IoT communication models, Iot Communication APIs- Enabling technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates - Domain specific IoTs.

UNIT II M2M AND IOT DESIGN METHODOLOGY 9

IoT and M2M- difference between IoT and M2M - Software defined networks, network function virtualization– Needs- IoT design methodology

UNIT III IOT COMPONENTS 9

Sensors and actuators - Communication modules - Zigbee- RFID-Wi-Fi-Power sources.

UNIT IV BUILDING IOT WITH HARDWARE PLATFORMS 9

Platform - Arduino/Raspberry Pi- Physical devices - Interfaces - Programming - APIs/Packages

UNIT V CASE STUDY 9

Various Real time applications of IoT- Home automation-Automatic lighting-Home intrusion detection-Cities-Smart parking-Environment-Weather monitoring system- Agriculture- Smart irrigation.

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015.

**REFERENCES:**

1. Manoel Carlos Ramon, ―Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers‖, Apress, 2014.

2. Marco Schwartz, ―Internet of Things with the Arduino Yun‖, Packt Publishing, 2014.

3. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012.

4. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key applications and Protocols”, Wiley Publications 2nd edition , 2013.

**U15CS1004R MOBILE APPLICATION DEVELOPMENT 3 0 0 3**

COURSE OUTCOMES

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

- Explain development framework and the need for mobile applications.
- Develop apps that use Android's messaging, multitasking, connectivity and media services to design full-featured apps primarily for mobile devices.
- Create applications with clean, effective user interfaces that take advantage of Android's rich UI frameworks.
- Leverage Android's effective frameworks and techniques to perform or schedule data retrieval/storage efficiently in a mobile environment.
- Understand the debugging tools in Android Studio and test the execution of a running program to create more reliable and robust apps.

UNIT I INTRODUCTION 9

Android: An Open Platform for Mobile Development– Android SDK Features- Introducing the development framework - Standard development environment for Android applications – Creating Your First Android Application – Types of Android Application- Android Development Tools

UNIT II ANDROID CORE 9

Android Basic Building Blocks - Toast or Snackbar – Notifications – localize an app – Job Scheduler - Android Application Lifecycle – Activities and their lifecycle

UNIT III USER INTERFACE 9

Introducing Layouts - Intents - Fundamental Android UI Design - Custom View – Recycler View – Menu based navigation – Drawer navigation

UNIT IV DATA MANAGEMENT 9

Introducing Adapters - Shared Preferences – Working with the file systems: Reading/writing local data, accessing the Internal File system, Accessing SD card - Introducing Android Databases- Introducing SQLite- Content Values and Cursors- Working with SQLite Databases

UNIT V DEBUGGING AND TESTING 9

Debugging in Android studio – Fixing issues in Android - fundamentals of testing - JUnit tests - Espresso UI - writing useful automated Android tests - Monetizing, Promoting, and Distributing Applications

**Total: 45 hour**

**TEXT BOOK**

1. Reto Meier, "Professional Android Application Development", 4th Edition, Wiley, 2014
2. https://developers.google.com/certification/associate-android-developer/study-guide/

**REFERENCE**

1. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012

**U15CS1006R** **DATA SCIENCE** **3 0 0 3**

Preamble

- Learn about the need for data science, with emphasis on data; Visualization in data science and engineering processes; various application of data science

COURSE OUTCOMES

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

- Comprehend Data science process
- Write R Programs for simple application
- Apply descriptive statistics to describe various features of data
- Perform exploratory data analysis for different models
- Implement Statistical models for real time application

UNIT I INTRODUCTION TO DATA SCIENCE 9

What is Data Science? - Big Data and Data Science hype – and getting past the hype - Why now? – Datafication - Current landscape of perspectives - Skill sets needed -Data science project – Defining the goal - Data collection and management - Modeling - Model evaluation and critique - Presentation and documentation - Model deployment and maintenance

UNIT II INTRODUCTION TO R 9

R objects and Classes: Vector – List – Factor – Matrix – Array – Dataframe – Manipulating Objects – Input/output - R Constructs – Functions in R – Charts and Graphs – Hands on practice in R – libraries – datasets in R

UNIT III DESCRIPTIVE STATISTICS 10

Central tendency – Mean, Median, Mode – Measure of Dispersion: Variance, Standard deviation – Measure of Shape- Skewness, Kutosis, Percentile – Association analysis: Covariance, Correlation, Types of Correlation: Pearson Correlation, Spearman Correlation, Kendall Correlation -Populations and samples - Statistical modeling, probability distributions, fitting a model

UNIT IV EXPLORATORY DATA ANALYSIS 9

Visualization before analysis – Dirty data – Visualizing a single variable – Examining multiple variable – Data exploration Vs. Presentation - Hypothesis testing – Difference of means – Wilcoson Rank-Sum test – Type I and Type II errors – Power and Sample size and ANOVA

UNIT V CASE STUDY 8

Clustering - clustering Iris data - Classification - classifying personal income - Regression - Predicting price of pre-owned cars

**Total : 45 Hours**

**Text Book**

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014

2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014

**Reference**


1. Noreen Burlingame and Lars Nielsen, “A Simple Introduction to DATA SCIENCE”, 2012.
2. Mark Gardener, “Beginning R - The Statistical Pr ogramming Language”, John Wiley & Sons, Inc., 2012.
3. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014
4. http://bigdatauniversity.com

http://www.johndcook.com/R_language_for_programmers.html

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

| 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 | U15CS701R | Security in Computing | 3 | 0 | 0 | 3 | 45 |
| 3 | U15CS702R | Artificial Intelligence | 3 | 0 | 0 | 3 | 45 |
| 4 | U15CS927R | **Elective** - Cloud Computing | 3 | 0 | 0 | 3 | 45 |
| 5 | U15CS934R | **Elective** -Software Testing | 3 | 0 | 0 | 3 | 45 |
| | | **Open Elective** | | | | | |
| 6 | U15CE1002R | Disaster Management | 3 | 0 | 0 | 3 | 45 |
| | U15CE1003R | Energy Efficiency and Green Building | | | | | |
| | U15EC1008R | Mobile Technology and its Application | | | | | |
| | 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 | Industry Safety | | | | | |
| | U15ME1005R | Maintenance Engineering | | | | | |
| | U15ME1010R | 3D Printing | | | | | |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| Dr.B.Sathiyabhama | Dr.R.Shivakumar | Dr.S.R.R.Senthil Kumar |

Copy to:-

HOD/Computer Science and Engineering, Seventh Semester BE CSE Students and Staff, COE

| Practical | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | U15CS703R | Full Stack Laboratory | 0 | 0 | 4 | 2 | 60 |
| 8 | U15CS704R | Machine Learning Laboratory | 0 | 0 | 4 | 2 | 60 |
| 9 | U15CS705R | Comprehension And Technical Report | 0 | 0 | 2 | 1 | 30 |
| | | | | | **Total Credits** | **23** | |

**Approved By**

**Chairperson, Computer Science and Engineering BoS**
Dr.B.Sathiyabhama

**Member Secretary, Academic Council**
Dr.R.Shivakumar

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

Copy to:-

HOD/Computer Science and Engineering, Seventh Semester BE CSE Students and Staff, COE

**U15CS701R SECURITY IN COMPUTING 3 0 0 3**

**COURSE OUTCOMES**

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

- Apply the cryptographic techniques to secure the user data
- Solve the vulnerabilities in software programs
- Design protection mechanisms against different kinds of security threats in networks
- Solve the various vulnerabilities database security
- Analyze the various models and standards for security

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | SECURITY IN COMPUTING | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 2 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

**UNIT I ELEMENTARY CRYPTOGRAPHY 9**

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates

**UNIT II PROGRAM SECURITY 9**

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors

**UNIT III SECURITY IN NETWORKS 9**

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

**UNIT-IV SECURITY IN DATABASES 9**

Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.

**UNIT-V SECURITY MODELS AND STANDARDS 9**

Secure SDLC – Secure Application Testing – Security architecture models – Trusted Computing Base – Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCI DSS – Security Standards - ISO 27000 family of standards – NIST.

**Total: 45 hours**

**TEXT BOOKS**


1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Pearson Education, 2015.


**REFERENCES**


1. William Stallings, "Cryptography and Network Security: Principles and Practices", Seventh Edition, Prentice Hall, 2017.
2. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, Mc Graw Hill Osborne Media, 2009.
3. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2004.
4. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Fifth Edition, Cengage publishers, 2017.
5. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-Wesley, 2002.
6. https://www.owasp.org/index.php/Top_10_2010
7. https://www.pcisecuritystandards.org/security_standards/pci_dss.shtml
8. http://cwe.mitre.org/top25/index.html

**U15GE701R PROFESSIONAL ETHICS AND HUMAN VALUES 3 0 0 3**

**COURSE OUTCOMES**
**At the end of the course, students will be able to**

- Identify the core values that mold the ethical behavior of an engineer
- Utilize ethical theories in engineering practices
- Implement ethical concerns and conflicts in solving societal problems
- Develop codes of conduct to accomplish safety in engineering tasks
- Solve the real world problems in a more ethical manner

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | PROFESSIONAL ETHICS AND HUMAN VALUES | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 2 | 3 | 3 | 1 | 1 | 3 | 1 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 2 | 1 | 1 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 |

**UNIT I HUMAN VALUES 9**

Morals, Values and Ethics – Integrity – Work Ethic – 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 – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9**

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

**UNIT IV ENGINEER'S RESPONSIBILITY FOR SAFETY 9**

Safety and Risk – Assessment of Safety and Risk – Risk analysis-Reducing Risk – The Government Regulator's Approach to Risk - Case Studies -Chernobyl and Bhopal

**Responsibilities and Rights**

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

**UNIT V GLOBAL ISSUES 9**

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

**Total: 45 hours**

**TEXT BOOKS**


1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, (2000).


**REFERENCES**


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

**U15CS702R ARTIFICIAL INTELLIGENCE 3 0 0 3**

**COURSE OUTCOMES**
**At the end of the course, students will be able to**

- Design an intelligent agent by considering the nature of environment and applications
- Solve the problems related to search application
- Design knowledge base for any application using propositional/first order logic
- Apply suitable learning algorithm for the given problem
- Design a communicative agent for NLP application

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | ARTIFICIAL INTELLIGENCE | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 3 |

**UNITI INTRODUCTION 9**

Introduction to Artificial Intelligence-The Foundations of Artificial Intelligence. The History of Artificial Intelligence-Intelligent Agents: Agents and Environments-The Concept of Rationality-The Nature of Environments-The Structure of Agents- Problem-Solving Agents-Example problems

**UNIT II PROBLEM SOLVING USING SERACH TECHNIQUES 9**

Uninformed Search Strategies- Avoiding Repeated States- Searching with Partial Information- Informed Search and Exploration: Informed (Heuristic) Search Strategies- Heuristic Functions- Local Search Algorithms and Optimization Problems- Constraint Satisfaction problems-Adversarial search- minimax algorithm- Alpha-Beta pruning

**UNIT III KNOWLEDGE AND REASONING 9**

Knowledge-Based agents – Logic –Propositional logic – First order logic- Representation – Syntax and semantics – Knowledge engineering – Inference in First order logic- Unification and lifting- Forward and backward chaining-Resolution

**UNIT IV SOFTWARE AGENTS 9**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

**UNIT V COMMUNICATION AND APPLICATIONS OF AI 9**

Communication: Phrase Structure Grammars - A Formal Grammar for a Fragment of English- Syntactic Analysis (Parsing) – Augmented Grammar and Semantic Interpretation - Machine translation –Speech recognition. Robot – Hardware – Perception – Planning – Moving - Tool for Artificial Intelligence -Tensor flow and IBM Watson.

**Total: 45 hours**

**TEXT BOOKS**

1.S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2015.

**REFERENCES**

1. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Harcourt Asia Pvt. Ltd., 2009.
2. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education, 2009.
3. Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013.
4. Tom Mitchell, "Machine Learning", McGraw Hill, 2015.
5. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.

**U15CS703R FULL STACK LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Design and develop static and dynamic web applications using Node.js, Angular.js, PHP, SQL, NoSql and Redis
- Design and develop front-end Web applications using HTML and cascading styles sheets
- Develop and deploy the Web application on any free webhosting providers and maintain the application version in Git

CO / PO, PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

| COs | FULL STACK LABORATORY | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 |

**LIST OF EXPERIMENTS**

- Implement a simple Node.js server application
- Integrate Node.js with SQL Database (MySQL/PostgreSQL/Oracle)
- Integrate Node.js with No SQL Database (MongoDB/Cassandra)
- Design a webpage using HTML and CSS
- Implement a dynamic webpage using Angular.js
- Implement a signup/login form using PHP
- Register the user login details in Redis using email
- Implement a script in Node.js to send email with a default content
- Implement a version control using GitHub
- Host a website in heroku/bytehost or any other free hosting providers
- Develop an simple Android application
- Develop an simple iOS application

**Total :60 hours**

**U15CS704R MACHINE LEARNING LABORATORY 0 0 4 2**

**COURSE OUTCOMES**

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

- Design the data warehouse schema
- Implement various classification algorithms
- Implement various clustering algorithms

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | MACHINE LEARNING LABORATORY | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |

**LIST OF EXPERIMENTS**

1. R Console and Data Analysis using R
2. R Expressions and Data Structures
3. Implement classification using K nearest neighbor classification
4. Implement classification using Decision classification
5. Implement classification using Random Forest classification
6. Implement decision tree based algorithm for classification
7. back propagation neural network algorithm
8. Implement K-means algorithm for clustering
9. Implement Hierarchical Clustering using R
10. Implement Apriori algorithm for association rule

**Total : 60 hours**

**U15CS705R COMPREHENSION AND TECHNICAL REPORT 0 0 2 1**

**COURSE OUTCOMES**

**At the end of the course, students should be able to**

- Acquire knowledge about the latest happenings in the area of Computer Science and Engineering
- Write technical content in a well-structured manner
- Create documentation and help for source code based projects

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | COMPREHENSION AND TECHNICAL REPORT | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 |

**LIST OF EXPERIMENTS**

1. Activity – 1
   Periodic tests with Objective Type Questions.
2. Activity – 2
   - Write an article / paper based on project works done by the students in their previous semesters, Present a PPT based on the article
   - - Structure the content using either a standard IEEE template or a standard template base, with the elements viz., equations, algorithms, images, graphs, charts, Tables etc., by using appropriate tools
3. Activity – 3
   Take an existing software project and create ―Software source code documentation and Help‖ using tools.

**Method of Evaluation**:

periodic tests with objective type questions based on their academic syllabi

Seminars and paper presentations

Source code documentation and Help‘generation

**REFERENCES**


1. Mike Markel, ―Technical Communication‖, Tenth Edition‖, 2012.
2. Thomas Arthur Rickard, ―A Guide to Technical writing‖, Read Books, 2011
3. Gerald J. Alred, Charles T. Brusaw, Walter E. Oliu, ―”The Handbook of Technical Writing”, Bedford/St Martins, Eleventh Edition, 2010
4. Word / Latex/ LyX, Adobe Frame Maker, SnagIt, MS Vision
5. Javadoc, ROBODoc or any other equivalent tools for source code documentation


**Total :30 hours**

**U15CS927R CLOUD COMPUTING 3 0 0 3**

**COURSE OUTCOMES**
**At the end of the course, students will be able to**

- Identify the suitable cloud computing model and services for the given application
- Interpret the role of virtualization in cloud computing
- Deploy private and public cloud in real-time environment
- Analyze various threats and risks associated with cloud security
- Analyze various challenges involved in migrating to cloud

| CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COs | CLOUD COMPUTING | | | | | | | | | | | | | | |
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 |
| CO5 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 |

**UNIT I OVERVIEW OF CLOUD COMPUTING 8**

Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing - Why Cloud Computing, Cloud service models (IaaS, PaaS & SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing - Introduction to AWS Public Cloud Vendor

**UNIT II VIRTUALIZATION 8**

Basics of virtualization, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing

**UNIT III WORKING WITH PRIVATE AND PUBLIC CLOUDS 10**

Private Cloud Definition - Characteristics of Private Cloud - Private Cloud deployment models, Private Cloud Vendors – CloudStack - Eucalyptus and Microsoft Private Cloud – Benefits and Challenges - Private Cloud implementation in Amazon EC2 service
What is Public Cloud - Why Public Cloud - When to opt for Public Cloud - Public Cloud Service Models and Public Cloud Vendors and offerings ( IaaS, PaaS, SaaS) - Demonstrating public cloud with AWS - Introduction to EC2 and Storage services of AWS - Private vs. Public Cloud – When to choose

**UNIT IV OVERVIEW OF CLOUD SECURITY 10**

Explain the security concerns in Traditional IT - Introduce challenges in Cloud Computing in terms of Application Security - Server Security and Network Security - Security reference model - Abuse and Nefarious Use of Cloud Computing - Insecure Interfaces and APIs - Malicious Insiders - Shared Technology Issues - Data Loss or Leakage - Account or Service Hijacking - Unknown Risk Profile - Shared security model between vendor and customer in IAAS/PAAS/SAAS - Implementing security in AWS

**UNIT V FUTURE DIRECTIONS IN CLOUD COMPUTING 9**

When and not to migrate to Cloud - Migration paths for cloud - Selection criteria for cloud deployment - Issues/risks in cloud computing - Future technology trends in Cloud Computing

**Total: 45 hours**

**TEXT BOOKS**


1. Cloud Computing: Principles and paradigms By Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, 2011
2. Cloud Computing, By Michael Miller, 2008


**REFERENCES**


1. Cloud computing: Implementation, management and security By Rittinghouse, John, W., CRC Press,2009
2. Cloud Computing Bible, By Barrie Sosinsky, Wiley, 2011
3. Cloud Computing Architected: Solution Design Handbook by Rhoton, John,2013
4. Cloud Security, A comprehensive Guide to Secure Cloud Computing by Krutz, Ronald L.; Vines, Russell Dean, Wiley,2010
5. Cloud Computing for dummies, By Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, 2009.
6. Cloud Computing: A Practical Approach, By Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter, McGraw Hill, 2010.
7. Handbook of Cloud Computing, By Borko Furht, Armando Escalante (Editors), Springer, 2010

**U15CS934R SOFTWARE TESTING 3 0 0 3**

**COURSE OUTCOMES**
**At the end of the course, students will be able to**

- Apply the complete software testing life cycle for the given real time environment
- Analyze the need for test and defect management process
- Identify and write the test plan, design test cases
- Demonstrate an automatic testing tool
- Write a test script and execute automated tests using an open source automation testing tool for a given applications

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

| COs | SOFTWARE TESTING | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | P09 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 |
| CO2 | 3 | 3 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 1 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 1 |
| CO4 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 |

**UNIT I BASIC OF TESTING 9**

Introduction to Testing – why and what, -Why is testing necessary? What is testing? Role of Tester, Testing and Quality, Overview of STLC- Software Testing Life Cycle - V model, Duration -SDLC vs STLC, different stages in STLC, document templates generated in different phases of STLC, different levels of testing, different types of testing- Static Testing, Duration -Static techniques, reviews, walkthroughs-Basics of test design techniques-Various test categories, test design techniques for different categories of tests. Designing test cases using MS-Excel

**UNIT II TEST AND DEFECT MANAGEMENT 9**

Test management- Documenting test plan and test case, effort estimation, configuration management, project progress management. Use of Testopia for test case documentation and test management - Defect management, -Test Execution, logging defects, defect lifecycle, fixing / closing defects- Use of Bugzilla for logging and tracing defects

**UNIT III TEST DATA MANAGEMENT 9**

Test Data Management –Overview, Why Test Data Management, Test Data Types, Need for Test Data Setup, Test Data Setup Stages, Test data management Challenges. Creating sample test data using MS-Excel-Basics of Automation testing

**UNIT IV TEST AUTOMATION 9**

Introduction to automation testing, why automation, what to automate, tools available for automation testing-Basics of Automation testing using Selenium- Introduction to Selenium, using Selenium IDE for automation testing,

**UNIT V WEB APPLICATION TESTING 9**

Automation using Selenium Web driver for automation testing, understanding Testing framework with Selenium Web driver for automation testing

**Total: 45 hours**

**TEXT BOOKS**

1. Rex Black (2001), Managing the Testing Process (2nd edition), John Wiley & Sons

2. Foundations of software testing ,Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black,2008

**REFERENCES**

1. Implementing Automated Software Testing: How to Save Time and Lower Costs While Raising Elfriede Dustin Pearson Education, 2009

2. Selenium.org - http://docs.seleniumhq.org/docs/

http://www.seleniumhq.org/download/

- Selenium-ide.xpi (latest current version)
- Selenium-java.jar (latest current version)
- Firebug.xpi (latest current version)
- Firepath.xpi (latest current version)
- IEDriverServer.exe (latest current version)
- Jxl.jar (latest current version

**U15CS1004R MOBILE APPLICATION DEVELOPMENT 3 0 0 3**

**COURSE OUTCOMES**

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

- Explain development framework and the need for mobile applications.
- Develop apps that use Android's messaging, multitasking, connectivity and media services to design full-featured apps primarily for mobile devices.
- Create applications with clean, effective user interfaces that take advantage of Android's rich UI frameworks.
- Leverage Android's effective frameworks and techniques to perform or schedule data retrieval/storage efficiently in a mobile environment.
- Understand the debugging tools in Android Studio and test the execution of a running program to create more reliable and robust apps.

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 | PSO3 |
| CO1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO4 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 2 | 3 | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 |

**UNIT I INTRODUCTION 9**

Android: An Open Platform for Mobile Development– Android SDK Features- Introducing the development framework - Standard development environment for Android applications – Creating Your First Android Application – Types of Android Application- Android Development Tools

**UNIT II ANDROID CORE 9**

Android Basic Building Blocks - Toast or Snackbar – Notifications – localize an app – Job Scheduler - Android Application Lifecycle – Activities and their lifecycle

**UNIT III USER INTERFACE 9**

Introducing Layouts - Intents - Fundamental Android UI Design - Custom View – Recycler View – Menu based navigation – Drawer navigation

**UNIT IV DATA MANAGEMENT** **9**

Introducing Adapters - Shared Preferences – Working with the file systems: Reading/writing local data, accessing the Internal File system, Accessing SD card - Introducing Android Databases- Introducing SQLite- Content Values and Cursors- Working with SQLite Databases

**UNIT V DEBUGGING AND TESTING** **9**

Debugging in Android studio – Fixing issues in Android - fundamentals of testing - JUnit tests - Espresso UI - writing useful automated Android tests - Monetizing, Promoting, and Distributing Applications

**Total: 45 hour**

**TEXT BOOK**


1. Reto Meier, "Professional Android Application Development", 4th Edition, Wiley, 2014
2. https://developers.google.com/certification/associate-android-developer/study-guide/


**REFERENCE**


1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012

**U15CS1005R OBJECT ORIENTED PROGRAMMING AND DATASTRUCTURES 3 0 0 3**

**PREAMBLE**

Object-oriented programming (OOP) is a programming language model organized around objects rather than "actions" and data rather than logic. Historically, a program has been viewed as a logical procedure that takes input data, processes it, and produces output data.The programming challenge was seen as how to write the logic, not how to define the data. Object-oriented programming takes the view that what we really care about are the objects we want to manipulate rather than the logic required to manipulate them. Examples of objects range from human beings (described by name, address, and so forth) to buildings and floors (whose properties can be described and managed) down to the little widgets on a computer desktop (such as buttons and scroll bars).

Data Structure is a way of collecting and organising data in such a way that we can perform operations on these data in an effective way. Data Structures is about rendering data elements in terms of some relationship, for better organization and storage. The course is designed to prepare the students to have fundamental knowledge on data structures which is an essential skill to work in any IT industry. This course is designed for the students in non-circuit branches

**U15CS1005R OBJECT ORIENTED PROGRAMMING AND DATASTRUCTURES 3 0 0 3**

## COURSE OUTCOMES:

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

- Understand the basic concepts of object oriented programming.
- Design program for real time applications using inheritance and polymorphism.
- Apply various linear tree data structures in real time applications.
- Implement the operations of tree traversals and hashing techniques.
- Develop and apply algorithms for real time applications using graphs

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 | PSO3 |
| CO1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 3 |
| CO2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 3 | 1 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |

### UNIT I PRINCIPLES OF OOP 9

Basic Concepts of Object Oriented Programming – Expressions – Control Structures, Functions - Classes and Objects, Class Members, Access Control, Pointers, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation (new and delete).

### UNIT II INHERITANCE AND POLYMORPHISM 9

Operator Overloading, Inheritance basics, types of inheritance, base class access control, compile time polymorphism, runtime polymorphism using virtual functions, abstract class, Exception Handling.

### UNITIII DATA STRUCTURES 9

Basic data structures, Abstract Data Type, Linear Data Structures- List ADT, Stack ADT, Queue ADT, Searching techniques-Linear Search, Binary Search.

### UNIT IV TREES AND HASHING 9

Basic terminologies, tree traversals, binary trees, binary search tree ADT, Hashing-Introduction –Hashing Techniques. Priority Queues -Binary heap.

**UNIT V: GRAPHS** **9**

Definitions, Topological sort, shortest path algorithm - Unweighted shortest path, Dijkstra's algorithm, Minimum Spanning Tree - Prim's algorithm, Kruskal's algorithm – Depth first search – Breadth first search.

**TOTAL: 45 HOURS**

**TEXT BOOKS :**

1. Mark Allen Weiss, "Data structures and Algorithms Analysis in C", 4th Edition, Prentice Hall, 2013.

2. E. Balagurusamy, "Object-Oriented Programming With C++", 3rd edition, Tata McGraw Hill, 2006.

**REFERENCES:**

1. Adam Drozdek, "Data structures and algorithms in C++", 3rd Edition, Cengage Learning, 2013.

2. Langsam, Augenstein and Tanenbaum "Data structures using C and C++", 2nd Edition, Prentice Hall of India, 1998

3. Micheal T. Goodrich, Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", Wiley Student edition, John Wiley and Sons, 2009.

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

| S. No | Course Code | Course Title | Lecture | Tutorial | Practical | Credit | Total Contact Hours |
|---|---|---|---|---|---|---|---|
| **Practical** | | | | | | | |
| 1 | U15CS801R | Project Work | 0 | 0 | 24 | 12 | 360 |
| | | | | | **Total Credits** | **12** | |

**Approved By**

| **Chairperson, Computer Science and Engineering BoS** | **Member Secretary, Academic Council** | **Chairperson, Academic Council & Principal** |
|---|---|---|
| Dr.B.Sathiyabhama | Dr.R.Shivakumar | Dr.S.R.R.Senthil Kumar |

Copy to:-

HOD/Computer Science and Engineering, Eighth Semester BE CSE Students and Staff, COE