USHARAMA

COLLEGE OF ENGINEERING AND TECHNOLOGY

**(AUTONOMOUS)**

(Approved by A.I.C.T.E & Permanently Affiliated to JNTU, Kakinada)
Accredited by NAAC with "A" Grade on NH 16,
Telaprolu, Krishna Dist – 521109

# B.TECH INFORMATION TECHNOLOGY
# COURSE STRUCTURE
# &
# SYLLABUS

**(Applicable for the batches admitted from the Academic Year 2019-20)**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

# COURSE STRUCTURE - INFORMATION TECHNOLOGY

**(Applicable for batches admitted from 2019-2020)**

| I - SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Course Category | Course Code | Courses | L | T | P | Contact Hrs./Wk | C |
| 1 | HMC | UR19HM101 | Communicative English | 2 | 0 | 0 | 2 | 2 |
| 2 | BSC | UR19BSC101 | Linear Algebra & Calculus | 3 | 1 | 0 | 4 | 4 |
| 3 | BSC | UR19BSC104 | Numerical Methods & Statistics | 3 | 0 | 0 | 3 | 3 |
| 4 | BSC | UR19BSC110 | Applied Chemistry | 3 | 0 | 0 | 3 | 3 |
| 5 | ESC | UR19ESC109 | Fundamentals of Computer Science | 3 | 0 | 0 | 3 | 3 |
| 6 | HMC | UR19HML101 | Communicative English Lab | 0 | 0 | 2 | 2 | 1 |
| 7 | BSC | UR19BSCL103 | Engineering and Applied Chemistry Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | ESC | UR19ESCL101 | Engineering Workshop & IT Workshop | 0 | 0 | 3 | 3 | 1.5 |
| | | | Total | 14 | 1 | 8 | 23 | 19 |

| II SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Course Category | Course Code | Courses | L | T | P | Contact Hrs./wk | C |
| 1 | HMC | UR19HM202 | Professional English | 2 | 0 | 0 | 2 | 2 |
| 2 | BSC | UR19BSC205 | Differential Equations & Vector Calculus | 3 | 0 | 0 | 3 | 3 |
| 3 | BSC | UR19BSC208 | Applied Physics | 3 | 0 | 0 | 3 | 3 |
| 4 | ESC | UR19ESC208 | Engineering Graphics & Drafting | 1 | 0 | 3 | 4 | 2.5 |
| 5 | ESC | UR19ESC210 | Problem Solving and Programming using C | 3 | 0 | 0 | 3 | 3 |
| 6 | ESC | UR19ESC211 | Digital Logic & Design | 3 | 0 | 0 | 3 | 3 |
| 7 | HMC | UR19HML202 | Professional English Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | BSC | UR19BSCL202 | Applied Physics Lab | 0 | 0 | 3 | 3 | 1.5 |
| 9 | ESC | UR19ESCL202 | Problem Solving and Programming Using C Lab | 0 | 0 | 3 | 3 | 1.5 |
| Mandatory Courses | | | | | | | | |
| 10 | MC | UR19MC200 | Engineering Exploration project* | 0 | 0 | 0 | 1 | 0 |
| 11 | MC | UR19MC202 | Applied Physics – Virtual lab* | 0 | 0 | 0 | 2 | 0 |
| 12 | MC | UR19MC204 | Environmental Studies* | 0 | 0 | 0 | 2 | 0 |
| | | | Total | 15 | 0 | 12 | 32 | 21 |
| *Internal Evaluation | | | | | | | | |

Credits for First year are 19+21=40

| III SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Course Category | Course Code | Courses | L | T | P | Contact Hrs/wk | C |
| 1 | PCC | UR19PCIT301 | Data Structures | 3 | 0 | 0 | 3 | 3 |
| 2 | PCC | UR19PCIT302 | Python Programming | 3 | 0 | 0 | 3 | 3 |
| 3 | PCC | UR19PCIT303 | Software Engineering | 3 | 0 | 0 | 3 | 3 |
| 4 | PCC | UR19PCIT304 | Object Oriented Programming through C++ | 3 | 0 | 0 | 3 | 3 |
| 5 | PCC | UR19PCIT305 | Computer Organization | 3 | 0 | 0 | 3 | 3 |
| 6 | PCC | UR19PCIT306 | Mathematical Foundations of Computer Science | 3 | 0 | 0 | 3 | 3 |
| 7 | PCC | UR19PCITL301 | Data Structures through C++ Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | PCC | UR19PCITL302 | Python Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| **Mandatory Course** | | | | | | | | |
| 9 | MC | UR19MCIT301 | Essence of Indian Traditional Knowledge | 0 | 0 | 0 | 3 | 0 |
| Total | | | | 18 | 0 | 6 | 27 | 21 |
| Employability Skills-I * | | | | | | | 2 | 0 |
| Self-Learning *(Technical Certificate) | | | | | | | 2 | 0 |
| *Internal Evaluation- Student should complete at-least one technical certificate as self-learning mandatory course. | | | | | | | | |

| IV SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| S.No | Course Category | Course Code | Courses | L | T | P | Contact Hrs/ wk | C |
| 1 | PCC | UR19PCIT401 | Java Programming | 3 | 0 | 0 | 3 | 3 |
| 2 | PCC | UR19PCIT402 | Operating Systems | 2 | 1 | 0 | 3 | 3 |
| 3 | PCC | UR19PCIT403 | Data Base Management Systems | 3 | 0 | 0 | 3 | 3 |
| 4 | PCC | UR19PCIT404 | Formal Languages and Automata Theory | 3 | 0 | 0 | 3 | 3 |
| 5 | BSC | UR19BSC401 | Statistics With R programming | 3 | 0 | 0 | 3 | 3 |
| 6 | PCC | UR19PCITL401 | Java Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| 7 | PCC | UR19PCITL402 | UNIX Operating System Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | PCC | UR19PCITL403 | Data Base Management Systems Lab | 0 | 0 | 3 | 3 | 1.5 |
| **Mandatory Courses** | | | | | | | | |
| 9 | MC | UR19MC401 | Professional Ethics & Human Values* | 0 | 0 | 0 | 3 | 0 |
| 10 | PROJ | UR19MPROJIT401 | Socially Relevant Mini Project- I* | 0 | 0 | 0 | 2 | 0 |
| Total | | | | 14 | 1 | 9 | 29 | 19.5 |
| *Internal Evaluation | | | | | | | | |

Credits for Second year are 21 + 19.5 = 40.5

| V SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S.No** | **Course Category** | **Course Code** | **Courses** | **L** | **T** | **P** | Contact hours/ week | **C** |
| 1 | PCC | UR19PCIT501 | Data Warehousing and Data Mining | 3 | 0 | 0 | 3 | 3 |
| 2 | PCC | UR19PCIT502 | Computer Networks | 3 | 0 | 0 | 3 | 3 |
| 3 | PCC | UR19PCIT503 | Compiler Design | 3 | 0 | 0 | 3 | 3 |
| 4 | PCC | UR19PCIT504 | Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| **Professional Elective- I** | | | | | | | | |
| 5 | PEC | UR19PEIT501 | Big Data with Hadoop | 3 | 0 | 0 | 3 | 3 |
| | | UR19PEIT502 | Data Storage Technologies and Networks | | | | | |
| | | UR19PEIT503 | Cloud Computing | | | | | |
| | | UR19PEIT504 | Software Analysis and Design | | | | | |
| | | UR19PEIT505 | Advanced Data Structures | | | | | |
| 6 | PCC | UR19PCITL501 | Data Mining Lab | 0 | 0 | 3 | 3 | 1.5 |
| 7 | PCC | UR19PCITL502 | Computer Networks & Compiler Design Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | PCC | UR19PCITL503 | AI Tools & Techniques Lab | 0 | 0 | 3 | 3 | 1.5 |
| **Mandatory Course** | | | | | | | | |
| 9 | PROJ | UR19MPROJIT501 | Socially Relevant Mini Project- II | 0 | 0 | 0 | 2 | 0 |
| **Total** | | | | **15** | **0** | **9** | **26** | **19.5** |
| **Employability Skills-II *** | | | | | | | **2** | **0** |
| **Self Learning *(Technical Certificate)** | | | | | | | **2** | **0** |
| ***Internal Evaluation- Student should complete at-least one technical certificate as self learning mandatory course.** | | | | | | | | |

| VI SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S.No** | **Course Category** | **Course Code** | **Courses** | **L** | **T** | **P** | Contact hours/ week | **C** |
| 1 | PCC | UR19PCIT601 | Web Services | 3 | 0 | 0 | 3 | 3 |
| 2 | PCC | UR19PCIT602 | Internet of Things | 1 | 0 | 0 | 1 | 1 |
| 3 | PCC | UR19PCIT603 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 | 3 |
| **Professional Elective -II** | | | | | | | | |
| 4 | PEC | UR19PEIT601 | NoSQL Databases | 3 | 0 | 0 | 3 | 3 |
| | | UR19PEIT602 | Malware Analysis and Reverse Engineering | | | | | |
| | | UR19PEIT603 | Cloud Analytics | | | | | |
| | | UR19PEIT604 | Software Architecture | | | | | |
| | | UR19PEIT605 | Android Application Development | | | | | |
| 5 | OEC | --- | **Open Elective- I** | 3 | 0 | 0 | 3 | 3 |
| 6 | HMC | UR19HM601 | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 | 3 |
| 7 | PCC | UR19PCITL601 | Web Services Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | PCC | UR19PCITL602 | Internet of Things Application Lab | 0 | 0 | 3 | 3 | 1.5 |
| **Total** | | | | **16** | **0** | **6** | **22** | **19** |
| *** Two certificate self learning courses are mandatory; otherwise the student should appear for an internal and external examination.** | | | | | | | | |

| VII SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S.No** | **Course Category** | **Course Code** | **Courses** | **L** | **T** | **P** | Contact hours/ week | **C** |
| 1 | PCC | UR19PCIT701 | UML & Design Patterns | 3 | 0 | 0 | 3 | 3 |
| 2 | PCC | UR19PCIT702 | Cryptography and Network Security | 3 | 0 | 0 | 3 | 3 |
| 3 | PCC | UR19PCIT703 | Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 4 | OEC | --- | **Open Elective -II** | 3 | 0 | 0 | 3 | 3 |
| **Professional Elective- III** | | | | | | | | |
| 5 | PEC | UR19PEIT701 | Python with Data Science | 3 | 0 | 0 | 3 | 3 |
| | | UR19PEIT702 | Digital Forensics | | | | | |
| | | UR19PEIT703 | Cluster & Grid Computing | | | | | |
| | | UR19PEIT704 | Software Testing Methodologies | | | | | |
| | | UR19PEIT705 | Full Stack Development | | | | | |
| **Professional Elective- IV** | | | | | | | | |
| 6 | PEC | UR19PEIT706 | Big Data Analytics | 3 | 0 | 0 | 3 | 3 |
| | | UR19PEIT707 | Cyber Forensics | | | | | |
| | | UR19PEIT708 | Soft Computing | | | | | |
| | | UR19PEIT709 | Software Project Management | | | | | |
| | | UR19PEIT710 | Distributed Systems | | | | | |
| 7 | PCC | UR19PCITL701 | UML Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | PROJ | UR19PROJIT701 | Internship | 0 | 0 | 0 | 0 | 2 |
| 9 | PROJ | UR19PROJIT702 | Project Stage-I | 0 | 0 | 3 | 0 | 1.5 |
| **Total** | | | | **18** | **0** | **6** | **24** | **23** |

| VIII SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **S.No** | **Course Category** | **Course Code** | **Courses** | **L** | **T** | **P** | Contact hours/ week | **C** |
| 1 | HMC | UR19HM 801 | Management and Organizational Behavior | 3 | 0 | 0 | 3 | 3 |
| 2 | OEC | --- | **Open Elective- III** | 3 | 0 | 0 | 3 | 3 |
| **Professional Elective-V** | | | | | | | | |
| 3 | PEC | UR19PEIT 801 | Knowledge Discovery | 3 | 0 | 0 | 3 | 3 |
| | | UR19PEIT 802 | Cyber Laws | | | | | |
| | | UR19PEIT 803 | Cloud Security | | | | | |
| | | UR19PEIT 804 | Software Security Essentials | | | | | |
| | | UR19PEIT 805 | Block Chain Technologies | | | | | |
| 4 | PROJ | UR19PROJIT801 | Project Satge-II | 0 | 0 | 18 | 18 | 9 |
| **Total** | | | | **9** | **0** | **18** | **27** | **18** |

**Total Credits: (19 +21) + (21 + 19.5) + (19.5 + 19) + (23+18) =160**

# List of Open Electives

**Open Electives offered by the Dept. of CE**

| S.No. | Course Code | Open Elective – I |
|---|---|---|
| 1. | UR19OECE601 | Introduction To GIS |
| 2. | UR19OECE602 | Environmental Pollution Control |
| 3. | UR19OECE603 | Conservation of Water Resources |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OECE701 | Metro Systems and Engineering |
| 5. | UR19OECE702 | Natural Disaster Mitigation and Management |
| 6. | UR19OECE703 | Total Quality Management |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OECE801 | Sanitary and Public Health Engineering |
| 8. | UR19OECE802 | Environmental and Industrial Hygiene |
| 9. | UR19OECE803 | Green Buildings |

**Open Electives offered by the Dept. of EEE**

| S.No. | Course Code | Open Elective – I |
|---|---|---|
| 1. | UR19OEEE601 | Neural Networks and Fuzzy Logic |
| 2. | UR19OEEE602 | Linear Control Systems |
| 3. | UR19OEEE603 | Electrical Safety Management |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OEEE701 | Programmable Logic Controllers |
| 5. | UR19OEEE702 | Energy Audit and Conservation Management |
| 6. | UR19OEEE703 | Electrical Technology |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OEEE801 | Non Conventional Energy Sources |
| 8. | UR19OEEE802 | Industrial Electrical Operation |
| 9. | UR19OEEE803 | Hybrid Electric Vehicles |

**Open Electives offered by the Dept. of ME**

| S.No. | Course Code | Open Elective – I |
|---|---|---|
| 1. | UR19OEME601 | Nano Technology |
| 2. | UR19OEME602 | Robotics |
| 3. | UR19OEME603 | Power Plant Engineering |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OEME701 | Operations Research |
| 5. | UR19OEME702 | Industrial Engineering & Quality control |
| 6. | UR19OEME703 | Advanced materials |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OEME801 | Optimization Techniques |
| 8. | UR19OEME802 | Green Engineering systems |
| 9. | UR19OEME803 | Mechatronics |

**Open Electives offered by the Dept. of ECE**

| S.No. | Course Code | Open Elective – I |
|---|---|---|
| 1. | UR19OEEC601 | Consumer Electronics |
| 2. | UR19OEEC602 | Digital Electronics |
| 3. | UR19OEEC603 | Analog and Digital I.C. Applications |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OEEC701 | Embedded Systems |
| 5. | UR19OEEC702 | Internet of Things (IoT) |
| 6. | UR19OEEC703 | Principles of Computer Communications and Networks |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OEEC801 | Microcontrollers |
| 8. | UR19OEEC802 | Principles of Electronic Communications |
| 9. | UR19OEEC803 | Electronic Measurements and Instrumentation |

**Open Electives offered by the Dept. of CSE**

| S.No. | Course Code | Open Elective – I |
|---|---|---|
| 1. | UR19OECS601 | Java Programming |
| 2. | UR19OECS602 | Data Base Management Systems |
| 3. | UR19OECS603 | C++ Programming |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OECS701 | Distributed Computing |
| 5. | UR19OECS702 | Deep Learning |
| 6. | UR19OECS703 | AI and ML for Robotics |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OECS801 | AI Tools & Techniques |
| 8. | UR19OECS802 | Information Security |
| 9. | UR19OECS803 | Big Data |

**Open Electives offered by the Dept. of IT**

| S.No. | Course Code | Open Elective-I |
|---|---|---|
| 1. | UR19OEIT101 | Data Structures |
| 2. | UR19OEIT102 | Computer Graphics |
| 3. | UR19OEIT103 | Data Science |
| | **Course Code** | **Open Elective – II** |
| 4. | UR19OEIT201 | Operating Systems |
| 5. | UR19OEIT202 | Python Programming |
| 6. | UR19OEIT203 | Web Technologies |
| | **Course Code** | **Open Elective – III** |
| 7. | UR19OEIT301 | Information Security |
| 8. | UR19OEIT302 | Mobile Application Development |
| 9. | UR19OEIT303 | Block Chain Technologies |

**I Year - I Semester** Course Code : UR19HM101

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

Internal: 30 Marks External: 70 Marks

**COMMUNICATIVE ENGLISH**

(Common to all branches)

**Course Objectives:**

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamic way
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writing skills
- Construct statements in writing and speaking in professional manner

**UNIT – I**
**Poem:** "Life" by Sarojini Naidu
**Grammar:** Articles
**Vocabulary:** Prefixes and Suffixes
**Writing:** Paragraph Writing
**Life-Skills:** Attitude

**UNIT – II**
**Essay:** A Drawer full of Happiness
**Grammar:** Prepositions
**Vocabulary:** Homonyms, Homophones, Homographs
**Writing:** Letter of Request and Apology
**Life-Skills:** Self- Management

**UNIT – III**
**Short Story:** "Half a Rupee Worth" by R.K. Narayan
**Grammar:** Tenses
**Vocabulary:** Idiomatic Expressions; Phrasal Verbs
**Writing:** Letter of Complaint and Appreciation
**Life-Skills:** Body Language

**UNIT – IV**
**Text:** Stephen Hawking – Positivity 'Benchmark'
**Grammar:** Question Tags, Conjunctions
**Vocabulary:** One - Word Substitutes, Collocations
**Writing:** Dialogue and Speech Writing
**Life-Skills:** Being Assertive

**UNIT – V**
**Poem:** Once Upon a Time by Gabriel Okara
**Grammar:** Degrees of Comparison
**Vocabulary:** Technical Abbreviations
**Writing:** E-mail Writing, Preparation of Resume and Letter of application
**Life-Skills:** Goal Setting, Working in a Team

**TEXT BOOK:**
'InfoTech English' – Maruti Publications

**REFERENCE BOOKS:**

Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press
Practical English Usage, Michael Swan, OUP, 1995

**NPTEL ONLINE COURSE:**

'Enhancing Soft skills & Personality Development

**Course Outcomes:**

**CO1:** Apply critical-thinking to develop writing skills
**CO2:** Understand and evaluate different kinds of prose tests.
**CO3:** Describe distinct literary characteristics of poems.
**CO4:** Analyze the major and minor details of a biography.
**CO5:** Develop grammar and vocabulary skills
**CO6:** Evaluate the effectiveness in improving life-skills.

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| **I Year - I Semester** | Course Code : UR19BSC101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

Internal: 30 Marks External: 70 Marks

**LINEAR ALGEBRA & CALCULUS**

(Common to all branches)

**Course Objectives:**

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

**UNIT – I**

**Matrices:** Solving system of homogeneous and non-homogeneous linear equations by Gauss elimination method. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

**UNIT – II**

**Sequences and Series:** Convergence and divergence, Ratio test - Comparison test -Cauchy's root test-. Fourier series, Euler's formulae, conditions for Fourier expansion, Even and Odd functions.

**UNIT – III**

**Mean Value Theorems:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (single variable & without proofs).

**UNIT – IV**

**Multivariable calculus:** Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**UNIT – V**

**Multiple Integrals:** Double integrals, change of order of integration, double integration in polar coordinates. Evaluation of triple integrals, change of variables.

**TEXT BOOK:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers

**Course Outcomes:**

**CO1:** Develop the use of matrix algebra techniques that is needed by engineers for practical Applications

**CO2:** Find or compute the Fourier series of Fourier series periodic signals.

**CO3:** Utilize mean value theorems to real life problems.

**CO4:** Translate the given function as series of Taylor's and Maclaurin's with remainders.

**CO5:** Familiarize with functions of several variables which are useful in optimization.

**CO6:** Apply Double integration in evaluating areas bounded by regions.

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**I Year - I Semester** Course Code : UR19BSC104

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

Internal: 30 Marks External: 70 Marks

**NUMERICAL METHODS & STATISTICS**

(CSE & IT)

**Course Objectives:**

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To familiarize the students with numerical methods of solving the non-linear equations.
- To familiarize the students with the foundations of probability and statistical methods

**UNIT – I**

**Solution to algebraic equations:** Solution of polynomial and transcendental equations: Bisection method, Regula-Falsi method, Iteration method and Newton-Raphson method.

**UNIT – II**

**Interpolation:** Finite differences, interpolation using Newton's forward and backward difference formulae, Gauss forward and backward interpolation formulae, Interpolation with unequal intervals, Newton's divided difference and Lagrange's formulae.

**UNIT – III**

**Numerical integration and Solution of ODE:** Numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations, Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first order ODE.

**UNIT – IV**

**Statistical Methods:** Coefficient of correlation, lines of regression, Curve fitting Principle of least squares, Method of least squares, fitting of other curves

**UNIT – V**

**Probability Distributions:** Random variables (discrete and continuous)**,** probability distribution, Moment generating function, Binomial - Poisson distribution, normal distribution, exponential distribution.

**TEXT BOOK:**

1.Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers

**REFERENCE BOOKS:**

1**.**Advanced Engineering Mathematics, Erwin kreyszig,
2.Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor,
3. Introductory methods of Numerical Analysis, S.S.Sastry.

**I Year - I Semester** Course Code : UR19BSC110

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

Internal: 30 Marks External: 70 Marks

**APPLIED CHEMISTRY**
**(CSE/IT)**

**Course Objectives:**

- Importance of usage of Plastics in household appliances and composites (FRP) in aerospace automotive industries.
- Select the fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- construction of galvanic cells as well as some batteries used in instruments are introduced. Understand the mechanism of corrosion which itself is explained by electrochemical theory
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- explain the computational chemistry and different applications of analytical instruments.

**UNIT – I HIGH POLYMERS AND PLASTICS**

**Polymerisation :** Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4 techniques)- Preparation, properties and applications of Polyethene, PVC, Bakelite and Teflon Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers. Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

**UNIT – II FUEL TECHNOLOGY**

**Fuels:**- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal –– Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knocking agents – Power alcohol – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

**UNIT – III ELECTROCHEMICAL CELLS AND CORROSION**

**Part-A:**

**ELECTROCHEMISTRY**

Introduction- Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell – Lead-Acid storage cells-Li cells. Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells.

**Part-B**

**CORROSION**

Corrosion:- Definition – Theories of Corrosion (electrochemical and chemical)-Galvanic corrosion,Differential aeration corrosion –Factors which influence the rate of corrosion - Protection from corrosion– Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

**UNIT – IV CHEMISTRY OF ADVANCED ENGINEERING MATERIALS**

**Nano materials**:- Introduction–Sol-gel method & chemical reduction method of preparation - Carbon

nano tubes-Preparation and Applications; **Solar Energy:**- Introduction, application of solar energy, photovoltaic cell: design, working and its importance **Liquid Crystals** :- Types and applications **Non-Elemental Semiconducting Materials:-**Stoichiometric, Controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors (Distillation, Zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) **Superconductors** :- Type-I & Type-2, properties &applications.

**UNIT – V**

**COMPUTATIONAL CHEMISTRY AND SPECTROSCOPIC STUDIES**

**COMPUTATIONAL CHEMISTRY:** Introduction,Ab Initio studies.

**SPECTROSCOPIC STUDIES:** Electromagnetic spectrum-UV(laws of absorption,instrumentation,theory of electronic spectroscopy,Frank-condon principle,chromophores and auxochromes,intensity shifts,applications), X-Ray difaction method , FT-IR(Instrumentation and IR of some organic compounds,applications)-MRI and CT scan(Procedure & Applications).

**TEXT BOOKS:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

**REFERENCE BOOKS:**

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM.

**Course Outcomes:**

**CO1:** Understand the advantages and limitations of plastic materials.
**CO2:** Relate the need of fuels as a source of energy.
**CO3:** Explain the theory of construction of batteries
**CO4:** The categorize the reasons for corrosion and study some methods of corrosion control.
**CO5:** Know the importance of advanced engineering materials like Nanomaterials, Liquid crystals, Semiconductors and superconductors.
**CO6:** Obtain the knowledge of computational chemistry and understand the principles of different analytical instruments.

*****

| **I Year - I Semester** | Course Code : UR19ESC109 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

Internal: 30 Marks External: 70 Marks

**FUNDAMENTALS OF COMPUTER SCIENCE**
**(EEE/CSE/IT)**

**Course Objectives:**

To study different types and working of a digital computer.

- To learn different number systems and representation of floating point numbers.
- To understand the need and working of memory and other peripheral devices.
- To be familiar with the internal organization of a computer.
- To study the interconnection of computers and applications of computer.

**UNIT – I INTRODUCTION**

History of Digital computers, types of computers, block diagram of a digital computers, various parts of a digital computer. Computer programming — Machine language, assembly language and high-level language programming.

**UNIT – II**

**NUMBER SYSTEMS**

Binary, Octal, Decimal and Hexadecimal number systems, conversion of numbers from one system to other system, Fixed point and floating-point representation of numbers, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic Operations

**UNIT – III**

**MEMORY AND PERIPHERALS**

Memories: Need for memory, Types of computer memories — magnetic, Dynamic and static memories, RAM, ROM, EPROM and EEPROM memories, Cache memory, Concept of Virtual memory. Peripheral Devices: Working of Keyboard and Mouse. Types of Printers and it's working. I/O Ports, Addressing I/o devices — programmed I/O, interrupt I/O, DMA.

**UNIT – IV**

**COMPUTER ORGANISATION**

Organization of a processor - Registers, ALU and Control unit, Register transfer language, micro operations, Instruction codes, Computer instructions, Instruction formats, Instruction cycle, Memory Reference Instructions, Input — Output instructions, Control memory, Address sequencing, Design of control unit-micro programmed control, hard wired control.

**UNIT – V**

**APPLICATIONS**

Various applications of Computers, Networking of Computers, LAN, WAN, MAN, Internet. Internet of Things (loT) applications to electrical engineering.

**TEXT BOOKS:**


1. Computer Fundamentals By PK Sinha, 6th Edition, BPB publications.
2. Fundamentals of Computers by E. Balagurusamy, McGrawHill edition.
3. Computer Fundamentals by Anitha Goel, Pearson education


**Course Outcomes:**

CO1: Understand the functioning and programming of computers.

CO2: Convert numbers from one type of system to other type of system.
CO3: Distinguish between different types of memories and learn the mapping of I/O devices.
CO4: Understand the functioning of peripheral devices and addressing I/o devices.
CO5: Demonstrate the internal organization of digital computer.
CO6: Apply digital computers for storing electrical engineering problems.

*****

| I Year - I Semester | Course Code : UR19HML101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

Internal: 20 Marks External: 30 Marks

# COMMUNICATIVE ENGLISH LAB

(Common to all branches)

**Course Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**List of Activities**

1) Introducing yourself
2) Greeting
3) Thanking and Responding to thanks
4) Requesting and Responding to requests
5) Making and Responding to complaints
6) Apologising and accepting apologies
7) Consonants : Plosives, Affricates and Nasals
8) Consonants: Fricatives, Liquids and Glides
9) Vowels: Pure vowels
10) Vowels: Dipthongs
11) Consonant clusters
12) Word Accent
13) Word Stress
14) Intonation

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Reference Manuals:**

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd ‘Strengthen Your Communication Skills’ published by Maruthi Publications

## Course Outcomes:

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

CO1 Apply expressions in day to day life

CO2 Build language proficiency by using patterns
CO3 Develop communication skills through various language activities
CO4 Outline of Letters and Sounds
CO5 Identify consonants and vowel sounds in phonetic script
CO6 Understand pronunciation, stress and intonation

*****

| **I Year - I Semester** | Course Code : UR19BSCL103 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

Internal: 20 Marks External: 30 Marks

**Engineering and Applied Chemistry Lab**

**Course Objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the chemistry theory.
- To learn the usage of electrical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.

**List of Experiments**

1. Introduction to Chemistry laboratory- Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Qualitative analysis, Quantitative analysis etc.
2. Trial experiment-Estimation of HCl by using standard $Na_2CO_3$solution.
3. Estimation of Total hardness of water by using standard EDTA solution.
4. Estimation of Zinc using standard EDTA solution.
5. Estimation of Copper using standard EDTA solution.
6. Estimation of $P^H$ of the given sample solution using $P^H$ meter.
7. Conductometric titration between Strong acid and Strong base.
8. Conductometric titration between Strong acid and Weak base.
9. Potentiometric titration between Strong acid and Strong base.
10. Potentiometric titration between Strong acid and Weak base.
11. Estimation of $KMnO_4$ using standard Oxalic acid.
12. Determination of Alkalinity of water.
13. Determination of Viscosity of given sample by Ostwald viscometer.
14. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
15. Estimation of Copper using standard $K_2Cr_2O_7$solution.
16. Preparation of Bakelite (Demo).

**Reference Books**


1. A Textbook of Quantitative Analysis, Arthur J.Vogel.
2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication.


**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course Outcomes:**

Upon the completion of course, student will be able to

CO1: Utilize different Analytical tools and execute experiments involving estimation of raw materials, finished products and environmental samples etc.

CO2: Utilize modern instruments like Conductometer PH meter and Potentiometer for the analysis of samples

CO3: Determine the total hardness present in water for its quality in drinking purpose

CO4: Estimate the Viscosity of oil and assess its suitability as a lubricant
CO5: Determine the alkalinity present in water for its quality in drinking purpose
CO6: Identify the adulteration of lemon juice for Vitamin-C

*****

| I Year - I Semester | Course Code : UR19ESCL101 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

Internal: 20 Marks External: 30 Marks

# ENGINEERNG WORK SHOP AND IT WORK SHOP

## ENGINEERNG WORK SHOP:

**Course Objectives:**

- To familiarize with the basics of tools and equipments used in fitting, carpentry, Sheet metal and smithy.
- To familiarize with the production of simple modes in the above trades.

**NOTE: At least one exercise to be done from each trade.**

**Trade: Carpentry:**

1. Cross –Lap joint
2. Mortise and Tenon joint
3. T-Lap joint

**FITTING:**

1. V-fit
2. Square fit
3. Dovetail fit

**Black Smithy:**

1. S-Hook
2. Round rod to square
3. Round rod to Hexagonal headed bolt
4. Making simple parts like chisel.

**House Wiring:**

1. Parallel/Series connection of three bulbs
2. Stair Case wiring
3. Florescent lamp fitting
4. Measurement of earth resistance

**Tin Smithy:**

1. Making rectangular tray
2. Making scoop
3. Making hopper
4. Making funnel

## IT WORK SHOP:

**Course Objectives:**

- IT Workshop is to impart basic computer usage and maintenance skills and to introduce you to a suite of productivity tools that will aid in your day to day activities.
- IT workshop works in a learning-by-doing mode. It concentrates more on hands-on experience for the participants rather theoretical classes.
- It enables the participant to make the best use of Microsoft Office Suite in their day-to-day requirements and make use of it to improve the standards in the educational environment.
- The IT Workshop prepares the participant to have a hands-on experience in maintaining and troubleshooting a PC by themselves.

Task1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor

Task2: Every student should individually install MS windows on the personal computer.

Task3: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals.

Task 4: Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 5: Excel Orientation: The importance of MS office 2007/10 tool Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 6: Basic power point utilities and tools which helpful to create basic power point presentation. Topic covered during this includes PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both Latex and Power point.

Task 7: Introduction to HTML &Basic syntax of html Attributes, elements, lists, and basic programs, Homepage using HTML Consisting of photo, name, address and education details as a table.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course Outcomes:**

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

CO1: Identify the peripherals, components of CPU along with the functions of CPU.

CO2: Implement the installation of Windows OS and explain about Hardware Troubleshooting.

CO3: Create HTML Homepage and use MS Office like Word, Excel and Power Point Presentation.

CO4: Apply basic Electrical Engineering knowledge for House-wiring Practice.

CO5: Make different components using Fitting and Carpentry.

CO6: Prepare simple jobs as per specifications using Tinsmithy tools and Blacksmithy Tools.

*****

**I Year - II Semester** Course Code : UR19HM202

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

Internal: 30 Marks External: 70 Marks

**PROFESSIONAL ENGLISH**

(Common to all branches)

**Course Objectives:**

- Recall and improve the language proficiency of the students inEnglish
- Paraphrase and interpret the ideas and thoughts in a dynamicway
- Prioritize the importance of practical learning ofEnglish
- Distinguish the various levels of Listening, Speaking, Reading and writingskills
- Construct statements in writing and speaking in professionalmanner

**UNIT – I**

**Poem:** "Enterprise" by

Nissim Ezekiel **Grammar:**

Types of Sentences

**Vocabulary:** Synonyms

**Writing:** Essay Writing

**Life-Skills:** Values and Ethics

**UNIT – II**

**Text:** Like a tree, unbowed:

WangariMaathai**Grammar:** Active Voice

& Passive Voice **Vocabulary:** Antonyms

**Writing:** Technical Report Writing **Life-Skills:** Time Management

**UNIT – III**

**Text:** Stay Hungry – Stay Foolish

**Grammar:** Common Errors in Articles and Prepositions

**Vocabulary:** Words Often Confused

**Writing:** Describing People, Places, Objects, Events

**Life-Skills:** Motivation

**UNIT – IV**

**Story:** The Cop and the Anthem by O. Henry

**Grammar:** Common Errors in Subject – Verb agreement

**Vocabulary:** Technical Vocabulary

**Writing:** Note- Making **Life-Skills:** Rapid Reading

**UNIT – V**

**Short Story: "**A Village School Master" by Oliver Gold Smith

**Grammar:** CommonErrors

**Vocabulary:** GRE WordList

**Writing:** Precise Writing / Information Article

**Life-Skills:** Career Planning

**TEXT BOOK:**

1. 'InfoTech English' – MarutiPublications

**REFERENCE BOOKS:**

1. Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge UniversityPress.
2. Practical English Usage, Michael Swan, OUP,1995
3. Remedial English Grammar, F.T. Wood, Macmillan,2007

**Course Outcomes:**
Upon completion of the course, the students will be able to
**CO1:** Apply critical thinking to develop writing skills
**CO2:**Evaluate common errors in grammar
**CO3:** Describe distinct literary characteristics of poems
**CO4:** Analyze the characteristics of one-act-plays
**CO5:** Develop correspondence skills and promotional writing skills
**CO6:** Evaluate the importance of values and ethics for career planning.

*****

**I Year - II Semester** Course Code : UR19BSC205

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

Internal: 30 Marks External: 70 Marks

**DIFFERENTIAL EQUATIONS & VECTOR CALCULUS**

(Common to all branches)

**Course Objectives:**

- To enlighten the learners in the concept of differential equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

**UNIT – I**

**Linear Differential Equations of Higher Order:** Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral with RHS of the forms e^ax, Sinax, Cosax, x^n, e^ax.V and xV. L-C-R Circuit problems.

**UNIT – II**

**First order Partial Differential Equations:** Formation of PDE, solutions of Lagrane's linear equation Method of grouping – Method of multipliers, Solution of non-linear PDEs of the forms f(p,q)=0, f(z,p,q)=0, f(x,p)=g(y,q), Z=px+qy+f(p,q).

**UNIT – III**

**Applications of Partial Differential Equations:** Method of Separation of variables-One dimensional Wave equation-Two dimensional Heat equation, Laplaceequation.

**UNIT – IV**

**Vector Differential Calculus:** Scalar and vector point functions, Gradient, Directional derivative. Divergence, Curl, Physical interpretation of operators.

**UNIT – V**

**Vector Integral Calculus:** Line integral-work done, surface and volume integrals, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof).

**TEXT BOOK:**

1. Higher Engineering Mathematics, B. S. Grewal.

**REFERENCE BOOKS:**

1. Advance Engineering in Mathematics, ErwinKreyszig.
2. Vector calculus, Schaum'sseries.

**Course Outcomes:**

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

**CO1:** Solve the differential equations related to various engineering fields.
**CO2:**Identify solution methods for partial differential equations that model physical processes.
**CO3:** Apply a range of techniques to find solutions of standard PDEs .
**CO4:**Classify the nature of the partial differential equations.
**CO5:**Interpret the physical meaning of different operators such as gradient, curl and divergence.
**CO6:** Estimate the work done against a field and circulation using vector calculus.

*****

**I Year - II Semester** Course Code : UR19BSC208

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

Internal: 30 Marks External: 70 Marks

**APPLIED PHYSICS**

(CSE&IT)

**Course Objectives:**

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.
- Impart the knowledge of materials with characteristic utility in appliances.

**UNIT – I**

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings.

**DIFFRACTION:**Diffraction - Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N -slits and circular aperture (qualitative) – Intensity distribution curves - Diffraction Grating – Grating spectrum – missing order– resolving power – Rayleigh's criterion – Resolving powers of Microscope, Telescope and grating (qualitative).

**UNIT – II**

**QUANTUM MECHANICS**: Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainity Principle –interpretation of wave function – Schröedinger Time Independent and Time Dependent wave equations – Particle in a potential box.

**UNIT – III**

**FREE ELECTRON THEORY & BAND THEORY OF SOLIDS :** Introduction – Classical free electron theory (merits and demerits only) - Quantum Free electron theory – electrical conductivity based on quantum free electron theory – Fermi Dirac distribution function – Temperature dependence of Fermi-Dirac distribution function - expression for Fermi energy -Density of states.

Bloch's theorem (qualitative) – Kronig-Penney model(qualitative) – energy bands in crystalline solids – E Vs K diagram – classification of crystalline solids – effective mass of electron – $m^*$Vs K diagram - concept of hole.

**UNIT – IV**

**SEMICONDUCTOR PHYSICS:** Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's equation.

**UNIT – V**

**MAGNETISM & DIELECTRICS:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para& Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation - Frequency dependence of polarization –

Applications of dielectrics.

**TEXT BOOKS:**

1. “A Text book of Engineering Physics” by M.N.Avadhanulu,P.G.Kshirsagar - S.ChandPublications, 2017.
2. “Engineering Physics” byD.K.Bhattacharya and PoonamTandon, Oxford press (2015).
3. “Engineering Physics” by R.K Gaur. and S.L Gupta., - DhanpatRai publishers, 2012.

**REFERENCE BOOKS:**

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Lasers and Non-Linear optics by B.B. Laud, New Age International Publishers (2008).
3. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
4. Physics for Engineers by M.R. Srinasan, New Age international publishers (2009).

**Course Outcomes:**

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

**CO1:**Studythe need of coherent sources and the conditions for sustained interferenceand the resolving power of various optical instruments.

**CO2:**State the fundamental concepts of quantum mechanics and analyze the physical significance Of wave function.

**CO3:**Explain the various electron theories and interpret the effects of temperature on Fermi Dirac distribution function

**CO4:**differentiatethe various energy bands

**CO5:**Classify the energy bands of semiconductors and outline the properties of n-type and p-type Semiconductors.

**CO6:**Analyze the applications of dielectric and magnetic materials.

*****

| **I Year - II Semester** | Course Code : UR19ESC208 | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 3 | 2.5 |

Internal: 30 Marks External: 70 Marks

**ENGINEERING GRAPHICS & DRAFTING**
**(ME/CSE/IT)**

**PRE-REQUISITES**: Mathematics, Physics

**Course Objective:**

- Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scalingetc.

**UNIT – I**

**INTRODUCTION TO ENGINEERING DRAWING**:

Introduction: Principles of Engineering Graphics and their significance - Drawing Instruments - Geometrical Constructions.

**Polygons:** Constructing regular polygons by general methods, inscribing and describing polygons on circles.

**Curves:** Ellipse ,Parabola and Hyperbola by general methods,

**Scales**: Diagonal scales and Vernier scales

**UNIT – II**

**ORTHOGRAPHIC PROJECTIONS**: Principle of orthographic projection-Method of Projections – First and third angle projection methods Projections of Points – Projections of straight lines of different orientations - True lengths and traces.

**UNIT – III**

**PROJECTIONS OF PLANES & SOLIDS**: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes. Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of theplanes.

**UNIT – IV**

**ISOMETRIC VI**EWS: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**UNIT – V**

**COMPUTER AIDED DRAFTING**: Introduction – Computer Aided drafting system –Advantages, Applications of AUTOCAD, Drafting software-AUTOCAD-Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit commands, Lettering & Dimensioning

**TEXT BOOKS:**


1.N. D. Bhatt, Engineering Drawing, Revised and Enlarged Edition, Charotar publishers,
2. Engineering Drawing by Agarwal&Agarwal, Tata McGraw HillPublishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, NewAge


**REFERENCE BOOKS:**


1. Engineering Drawing by K.L.Narayana& P. Kannaiah, ScitechPublishers
2. Engineering Graphics for Degree by K.C. John, PHIPublishers
3. Engineering Graphics by PI Varghese, McGrawHillPublishers

**Course Outcomes:**

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

**CO1:** Use the geometrical objects considering BIS standards.

**CO2:** Identify the basics of orthographic projections and deduce orthographic projections of a point and a line at different orientations.

**CO3:** Plan the visualization of geometrical planes of different positions in real life environment.

**CO4:** Sketch the projection of various of types of solids.

**CO5:**prepare the orthographic views of various solid objects at different orientations.

**CO6:**Judge the significance of isometric drawing to relate 2D environment with 3D environment. Learn basics of CAD.

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| **I Year - II Semester** | Course Code : UR19ESC210 | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

Internal: 30 Marks External: 70 Marks

**Problem Solving and Programming Using C**

**(CE/EEE/ECE/CSE/IT)**

**Course Objectives:**

- The objectives of this course are to make the student familiar with 'problem solving using computers, development of algorithms, usage of basic flowchart symbols and designing flowcharts.
- The students can also understand programming language basic concepts, reading and displaying the data, earn the programming skills using selection, iterative control structures, functions, arrays, pointers and files. After completion of this course the student is expected to analyze the real life problem and write programs in C language to solve theproblems.

**UNIT – IINTRODUCTION**

Problem Solving: Problem solving aspects, Problem solving techniques, Computer as a Problem solving tool, Algorithms-definition, features, criteria. Flowchart-definition, basic symbols, sample flowcharts. Top down design, Implementation of program verification, The efficiency of algorithms, Analysis of algorithms, computational complexity of algorithm, order(O) notation, Worst case & Average case Analysis.

**UNIT – II**

Basics of C programming language: Introduction to C, structure of a C program,.basic data types and sizes, constants, variables, unary, binary and ternary operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, Input and Output statements, Sample Programs.

SELECTION-DECISION MAKING CONDITIONAL CONTROL STRUCTURES: simple-if, if- else, nested if-else, if- else ladder and switch-case.

ITERATIVE: while-loop, do-while loop and for loop control structures, goto, break and continue statements. Sample Programs.

**UNIT – III**

FUNCTIONS-basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs :

ARRAYS-concepts, declaration, definition, accessing elements, storing 'elements, 1-D arrays, 2-D arrays and character arrays, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix, Passing 1-D arrays, 2-D arrays to functions, Strings and String Manipulations

**UNIT – IV**

POINTERS-pointers concepts, initialization of pointer variables, pointers and function arguments, passing by address-dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and -multi-dimensional arrays, dynamic memory

management functions, command line arguments

**UNIT – V**

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing 'structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

FILEHANDLING: Concept of a file, text files and binary files, Formatted I/O, File I/O operations

**TEXT BOOKS:**

1. How to Solve it by Computer, R. G. Dromey, Pearson Education,2019
2. ProgramminginC,AshokNKamthane,AmitAshokKamthane,3rdEdition,PearsonEducation, 2019

**Reference Books:**

1. The C programming Language by Dennis Richie and BrianKernighan
2. Programming in C, ReemaThareja,OXFORD
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad,Cengage

**Course Outcomes:**

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

**CO1:**Design efficient algorithm for solving a problem.
**CO2:**Identify various constructs of C programming language efficiently.
**CO3:**Apply programs using modular approach such as functions.
**CO4:**Create programs to perform matrix and mathematical applications.
**CO5:**Understand dynamic memory management and problems using pointers and solving the problems.
**CO6:**Developreal life applications using structures and also learn about handling the files for storing the data permanently.

*****

**I Year - II Semester** Course Code : UR19ESC211

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

Internal: 30 Marks External: 70 Marks

**DIGITAL LOGIC DESIGN**

(**CSE &IT**)

**Course Objectives:**

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

**UNIT – I**

**Digital Systems and Binary Numbers :** Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction.

**UNIT – II**

**Concept of Boolean algebra & Gate level Minimization** : Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms, Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation, Exclusive-OR Function.

**UNIT – III**

**Combinational Logic** : Introduction, Analysis Procedure, Design Procedure, Binary Adder– Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits.

**UNIT – IV**

**Synchronous Sequential Logic:** Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked Sequential Circuits, Mealy and Moore Models of Finite State Machines.

**UNIT – V**

**Registers and Counters**: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter.

**TEXT BOOKS:**

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

**REFERENCE BOOKS:**

1. Digital Logic and Computer Design, M.Morris Mano, PEA.
2. Digital Logic Design, Leach, Malvino, Saha, TMH.
3. Modern Digital Electronics, R.P. Jain, TMH.

**Course Outcomes:**

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

**CO1:** Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

**CO2:**Identify the different switching algebra theorems and apply them for logic functions.

**CO3:** Define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.

**CO4:** Differentiate combinational logic circuit and sequential logic circutes.
**CO5:**Identify the usage of different registers.
**CO6:** Judge the use of different counters.

*****

| I Year - II Semester | Course Code : UR19HML202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

Internal: 20 Marks External: 30 Marks

**PROFESSIONAL ENGLISH LAB**

(Common to all branches)

**Course Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**List of activities:**

1) Body Language: facial expressions, body posture, gestures
2) Body Language: eye movement, touch and the use of space
3) JAM
4) Extempore
5) Debate: Lincoln-Douglas debate and dos and don'ts
6) Debate: Formal and Informal debate
7) Interview Skills: Formal and Informal Interview
8) Interview Skills: Telephonic interview
9) Group Discussion: Dos and don'ts, general topics
10) Group Discussion: Science and technical topics
11) Presentation: Elimination of stage fear and preparation
12) Presentation on general topics
13) Presentation: using ppt or visual aids.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Reference Manuals:**

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

**Course Outcomes:**

Upon Completion of the course, the student will be able to:

CO1 Understand different types of body language
CO2 Develop communication skills through various language activities
CO3 Apply critical thinking to get main ideas for debate
CO4 Develop audacity to face an interview
CO5 Build knowledge for discussing topics effectively
CO6 Analyze a topic by making a presentation

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| **I Year - II Semester** | Course Code : UR19BSCL202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

Internal: 20 Marks External: 30 Marks

**APPLIED PHYSICS LAB**

**Course objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

**List of Experiments**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Energy Band gap of a Semiconductor p - n junction.
6. Characteristics of Thermistor – Temperature Coefficients
7. Determination of dielectric constant by charging and discharging method
8. Determination of resistivity of semiconductor by Four probe method.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. Measurement of magnetic susceptibility by Quincke's method.
11. Dispersive power of diffraction grating.
12. Verification of laws of stretched string – Sonometer.
13. Resolving power of grating.
14. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall effect.
15. Variation of dielectric constant with temperature.

**Text book**:

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course outcomes:**

Upon the completion of course, student will be able to

**CO1:** operate optical instruments like microscope and spectrometer.
**CO2:** interpret the thickness of a hair/paper with the concept of interference.
**CO3:** determine the wavelength and resolving power of different colors using diffraction grating.
**CO4:** estimate the strength of the magnetic field due to a current carrying coil.
**CO5:** estimate the dielectric constant by charging and discharging method.
**CO6:** measurement of magnetic susceptibility by Quincke's method.

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| I Year - II Semester | Course Code : UR19ESCL202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 3 | 1.5 |

Internal: 20 Marks External: 30 Marks

## Problem Solving and Programming using C Lab

**Course Objectives:**

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

**Exercise 1**

a) Write a C Program to calculate the area of a triangle.
b) Write a C program to find the largest of three numbers using ternary operator.
c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

a) Write a C program to find the 2's complement of a binary number.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

**Exercise 3**

a) Write a C program to find the sum of individual digits of a positive integer and, also, find 'the reverse of the given number.
b) Write a C program to generate the first n terms of the Fibonacci sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 4**

a) Write a C Program to print the multiplication table of a given number.
b) Write a C Program to read a decimal number and find its equivalent binary number.
c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

a) Write a C program to interchange the largest and smallest numbers in the given array.
b) Write a C program to implement a liner search on a given set of values.
c) Write a C program to implement binary search on a given set of values.

**Exercise 6**

a) Write a C program to implement sorting of an array of elements.
b) Write a C program to input two m x n matrices, check the compatibility and perform 'addition and multiplication of them.

**Exercise 7**

Write a C program that uses functions to perform the following operations:

i. To insert a sub-string into given main string at a given position.
ii. To delete n characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location.

**Exercise 8**

Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings to append a string to another string
- to compare two strings

**Exercise 10**

a) Write C Program to find the number of characters in a given string including and excluding spaces.
b) Write C Program to copy the contents of one string to another string without using string handling functions.
c) Write C Program to find whether a given string is palindrome or not.
d) Write a C program to find both the largest and smallest number of an array of integers using call by value and call by reference.

**Exercise 11**

Write a C program using recursion for the following:

a) To display sum of digits of given number
b) To find the factorial of a given integer
c) To find the GCD (greatest common divisor) of two given integers.
d) To find Fibonacci sequence

**Exercise 12**

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two 2D arrays using pojnters
c) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

**Exercise 13**

Examples which explores the use of structures, union and other user defined variables.

**Exercise 14**

a) Write a C program. which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**Note:** Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Course Outcomes:**

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

CO1: Apply and practice logical ability to solve the problems.

CO2: Identify C programming development environment, compiling, debugging, and linking and executing a program using the development environment.

CO3: Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.

CO4: Apply the in-built functions and customized functions for solving the problems.

CO5: Create C programs using pointers, memory allocation techniques.

CO6: Use files for dealing with variety of problems.

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**I Year - II Semester** Course Code : UR19MC200

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 0 | 0 |

Internal: 20 Marks External: 0 Marks

Semester-end: 30 Marks

# ENGINEERING EXPLORATION PROJECT

## COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge.

**Apply Design thinking on the following Streams to**

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

## HOW TO PURSUE THE PROJECT WORK?

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

## TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

**Task 2: The Wallet/Bag Challenge and Podcast**

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

**Task 3: Teams & Problems**

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

**Task 4: Empathizing**

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

**Task 5: Ideating**

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

**Task 6: Prototyping**

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

**Task 7: Testing**

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

**Task 8:**

- Final Report Submission and Presentation

**Note:** The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

**REFERENCES:**

1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)

2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)

3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

**OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:**

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

| **I Year - I Semester** | Course Code : UR19MC202 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 0 |

Internal: 20 Marks External: 0 Marks
Semester-end: 30 Marks

## APPLIED PHYSICS - VIRTUAL LAB

**(Any 3 of the following listed 12 experiments)**

**Course objectives:**

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.

**LIST OF EXPERIMENTS**

2. Hall Effect
3. Crystal Structure
4. Brewster's angle
5. Numerical Aperture of Optical fiber
6. Photoelectric Effect
7. LASER – Beam Divergence and Spot size
8. Michelson's interferometer
9. Black body radiation
10. Flywheel –moment of inertia
11. AC Sonometer
12. Resistivity by four probe method
13. Newton's rings –Refractive index of liquid

***URL: www.vlab.co.in***

**Course outcomes:**

CO1: Handle optical instruments like microscope and spectrometer
CO2: Determine thickness of a hair/paper with the concept of interference

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**I Year - II Semester** Course Code : UR19MC204

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 0 | 0 |

Internal: 100 Marks External: 0 Marks

## ENVIRONMENTAL STUDIES

(CSE & IT)

**Course Objectives:**

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties.

**UNIT – I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope andImportance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers,consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT – II**

**Natural Resources:** Natural resources and associated problems Forest resources–Use and over–exploitation, deforestation–Timber extraction–Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-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 Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystemdiversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT – IV**

**Environmental Pollution:** Definition, Cause, effects and control measures ofAir pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in

prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urbanand industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

**UNIT – V**

**Social Issues and the Environment:** Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection 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.

**Environmental Management**: Impact Assessment and its significance variousstages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**TEXT BOOKS:**


1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.


**REFERENCE BOOKS:**


1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, ShaashiChawla, TMH, New Delhi.
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi.
4. Perspectives in Environment Studies, AnubhaKaushik, C P Kaushik, New Age International Publishers, 2014.


**Course Outcomes:**

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

**CO1:** Identify the natural resources, ecology, Biodiversity, and conservation of natural resources

**CO2:** Explain various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

**CO3:** Judge the social issues both rural and urban environment and the possible means to combat the challenges

**CO4:** Identify the Environmental Impact Assessment and environmental legislations of India and global initiatives towards sustainable development.

**CO5:** Analyze the concept of Biodiversity and its conservation

**CO6:** Survey the concept of Solid Waste Management.

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**B.Tech III Semester** **COURSE CODE: UR19PCIT301** **L T P C**
**3 0 0 3**

## Data Structures

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives**:

1. Allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs

2. To choose the appropriate data structure and algorithm design method for a specified application.

3. To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.

4. To efficiently implement the different data structures and solutions for specific problems.

**UNIT-I:**

**ARRAYS** Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type

Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

**UNIT II:**

**Introduction**, searching and sorting: Algorithm specification: Introduction, Recursive algorithms, Data Abstraction, Performance Analysis: Space complexity, time complexity, asymptotic notation,

Searching: Linear and Binary search algorithms, Sorting: Bubble sort, Selection sort, Insertion sort, quick sort, merge sort

**UNIT III:**

**Stacks and Queues**: Stacks, stacks using dynamic arrays, queues, circular queues using dynamic arrays, Evaluation of an expression: Expressions, evaluating postfix expression, conversion of infix expression to postfix expression.

**UNIT IV:**

**Linked Lists**: Single linked lists, Representing chains, operations for chains, operations for circularly linked lists, doubly linked lists, Polynomials: Representation, adding polynomials, sparse matrix representation, linked stacks and queues

**UNIT V:**

**Trees**: Introduction: Terminology, representation of trees, binary trees: abstract data type, Properties of binary trees, binary tree representation, binary tree traversals: Inorder, preorder, postorder, Binary search trees: Definition, searching BST, insert into BST, delete from a BST, Height of a BST

The Graph ADT: Introduction, definition, graph representation, elementary graph operations: BFS, DFS, Spanning trees, minimum cost spanning tree: Prim‟s, Kruskal‟s algorithms.

**TEXT BOOKS:** 1. Data structures, Algorithms and Applications in C++, S. Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press, Pvt. Ltd.

2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

3. Data structures and Algorithms in C++, Michael T. Goodrich, R. Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

**REFERENCE BOOKS:**

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson

2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

3. Problem solving with C++, The OOP, Fourth edition, W. Savitch, Pearson education.

**Course Outcomes**:

At the end of this course student will:

1. Analyze the concepts of algorithm evaluation and find time and space complexities for searching and sorting algorithms.

2. Implement linear data structure such as stacks, queues, linked lists and their applications.

3. Implement basic operations on binary trees

4. Demonstrate the representation and traversal techniques of graphs and their applications.

5. Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.

6. Student will be able to choose appropriate data structure as applied to specified problem definition.

**B.Tech III Semester** **COURSE CODE: UR19PCIT302** **L T P C**
**3 0 0 3**

# Python Programming

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives**:
1. Introduction to Scripting Language

2. Exposure to various problems solving approaches of computer science

7. Interpret the concepts of Object-Oriented Programming as used in Python.

**UNIT I:**

**Introduction**- Why we program, creativity and motivation, computer hardware architecture, Understanding programming, Words and sentences, conversing with Python, terminology: interpreter and compiler, writing a program, what is a program, the building blocks of programs, what could possibly go wrong, the learning journey. History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

**UNIT – II:**

**Types, Operators and Expressions:** Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

**UNIT – III:**

**Data Structures** Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages

**UNIT – IV:**

**Object Oriented Programming OOP in Python**: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

**UNIT – V:**

**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

**TEXT BOOKS**

1. Python Programming: A Modern Approach, VamsiKurama, Pearson
2. Learning Python, Mark Lutz, Orielly

**REFERENCE BOOKS:**

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage

**Course Outcomes**:

At the end of this course student will:

1. Understand the fundamentals of Python Programming Language.
2. Recognize and construct common programming idioms: variables, loop, branch statements, functions and develop Python programs for a given application.
3. Analyze string functions and concept of files in python programming
4. Understand the concepts of searching and extracting data using regular expressions
5. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
6. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

**B.Tech III Semester** **COURSE CODE: UR19PCIT303** **L T P C**
**3 0 0 3**

## Software Engineering

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. An understanding of different software processes and how to choose between them

2. How to elicit requirements from a client and specify them

3. Designing the large, including principled choice of software architecture, the use of modules and interfaces to enable separate development, and design patterns.

4. Understanding good coding practices, including documentation, contracts, regression tests and daily builds.

**UNIT I:**

**Software and Software Engineering**: The Nature of Software, the Unique Nature of Webapps, Software Engineering, the Software Process, Software Engineering Practice, Software Myths

Process Models: Generic Process Model, Prescriptive Process Models, Specialized Process Models, Unified Process

**UNIT II:**

**Understanding Requirements:** Eliciting Requirements, Developing Use Cases. Requirements Modelling: Scenario Based Modelling, Class Based Modelling

**UNIT III:**

**Design Concepts:** Design Process, Design Concepts, And The Design Model. Architectural Design: Architectural Styles, Architectural Design, Component Level

Design: Designing Class Based Components

**UNIT IV:**

**Software Testing Strategies**: A Strategic Approach to Software Testing, Test Strategies for Conventional Software, Test Strategies for Object Oriented Software, Validation Testing, System Testing, the Art of Debugging.

Testing Conventional Applications: White Box Testing, Black-Box Testing.

**UNIT V:**

**Risk Management**: Reactive Vs. Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan

**Quality Management**: What Is Quality, Software Quality

**Software Quality Assurance**: Elements Of Software Quality Assurance, SQA Tasks, Goals And Metrics, The ISO 9000 Quality Standard, SQA Plan.

**Software Maintenance**: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

**TEXT BOOKS**

Software Engineering, 7/E , Roger S. Pressman , TMH

**REFERENCE BOOKS:**

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley

2. Software Engineering Principles and Practice, W S Jawadekar, TMH

3. Software Engineering Concepts, R Fairley, TMH.

**Course Outcomes:**

At the end of this course student will:

1. Understand the core principles of software engineering

2. Apply appropriate software process model for a given scenario

3. Analyze the requirements for a given problem

4. Apply the design paradigms to design simple software system

5. Identify the fundamental principle of test-driven development methods

6. Interpret the risk strategies to assure the quality of software

**B.Tech III Semester** **COURSE CODE: UR19PCIT304** **L T P C**
**3 0 0 3**

# Object Oriented Programming through C++

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. Expertise in object oriented principles and their implementation in C++
2. Exposure to basics of object oriented mode, C++ programming and I/O in C++
3. Focus on Basic concept in C++ programming
4. Acquaintance with classes, objects and member functions
5. Focus on constructors, destructors, variants in them, operator overloading, type conversions
6. Concentration on inheritance, types of inheritance, polymorphism, virtual functions

**UNIT I :**

**INTRODUCTION:** Differences Between C And C++, The Object Oriented Technology , Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of Oop. Structure of A C++ Program, Header Files and Libraries

**INPUT AND OUTPUT IN C++ :**

Introduction, Streams In C++ And Stream Classes, Pre- Defined Streams, Stream Classes, Formatted And Unformatted Data,Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators

**UNIT II :**

**Operators**, control structures , functions, overloading, recursion Tokens In C++, Variable Declaration and Initialization, Data Types, Operators In C and C++, Scope Access Operator, Namespace, Memory Management Operators, Comma

**Operator, Revision of Decision Statements, Control Loop Statements FUNCTIONS IN C++ :** Introduction, Structure of Function, Passing Arguments, Lvalues and Rvalues, Retrun By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles of Function Overloading, Recursion

**UNIT III :**

**CLASSES AND OBJECTS** : Introduction, Classes In C++,Declaring Objects, Access Specifiers and Their Scope, Member Functions, Outside Member Function as Inline, DataHiding or Encapsulation, Classes, Objects and Memory, Static Member Variables, Static Member Functions Static Object, Array of Objects, Objects as Function Arguments, Friend Functions, The Const Member Functions, The Volatile

Member Function, Recursive Member Function, Local Classes, Empty, Static And Const Classes, Member Function And Non- Member Function, Overloading Member Functions, Nested Class

**UNIT IV :**

**CONSTRUCTORS AND DESTRUCTORS** : Introduction, Characteristic of Constructors & Destructors, Applications With Constructors, Parameterized Constructor, Overloading Constructors (Multiple Constructors), Array of Objects Using Constructors, Constructors With Default Arguments, Copy Constructors, The Const Objects, Destructors, Calling Constructors and Destructors, Qualifier And Nested Classes, Anonymous Objects, Private Constructors and Destructors, Dynamic Initialization Using Constructors, Dynamic Operators and Constructors, Recursive Constructor, Constructor And Destructor With Static Members, Local Vs. Global Object

**OPERATOR OVERLOADING AND TYPE CONVERSION**: Introduction, Overloading Unary Operators, Constraint on Increment and Decrement Operators, Overloading Binary Operators, Overloading With Friend Function, Overloading Assignment Operator (=), Type Conversion, Rules for Overloading Operators, One Argument Constructor and Operator Function, Overloading Stream Operators

**UNIT V :**

**INHERITANCE** : Introduction, Reusability, Access Specifiers and Simple Inheritance, Protected Data With Private Inheritance, Types of Inheritances(Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Multipath Inheritance), Virtual Base Classes, Constructors, Destructors, and Inheritance, Object as a Class Member, Abstract Classes, Qualifier Classes And Inheritance, Constructor in Derived Class, Pointers and Inheritance, Overloading Member Function, Advantages of Inheritance, Disadvantages of Inheritance.

**BINDING, POLYMORPHISM AND VIRTUAL FUNCTIONS:** Introduction, Binding In C++, Static (Early) Binding, Dynamic (Late) Binding, Pointer to Base and Derived Class Objects, Virtual Functions, Rules For Virtual Functions, Array of Pointers, Pure Virtual Functions, Abstract Classes, Working of Virtual Functions, Virtual Functions in Derived Classes, Object Slicing, Constructors and Virtual Functions, Virtual Destructors, Destructor and Virtual Functions.

**EXCEPTION HANDLING** : Introduction, Principles of Exception Handling, The Keywords Try, Throw and Catch , Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-Throwing Exception, Specifying Exception, Exceptions In Constructor and Destructors, Controlling Uncaught Exceptions, Class Template With Exception Handling.

**TEXT BOOKS :**

1. Programming In C++ , Ashok N Kamthane. Pearson 2nd Edition.
2. Object Oriented Programming C++ , Joyce Farrell, Cengage
3. Mastering C ++, Venugopal, Rajkumar, Ravi kumar TMH
4. Object Oriented Programming with C++, 2nd ed, SouravSahay, OXFORD

**REFERENCE BOOK**:

1. The Complete Reference, C++, 4ed, Herbert Schildt, TMH

**Course Outcomes**:

At the end of this course student will:

1. Understand the basic terminology used in computer programming
2. Write, compile and debug programs in C++ language. Use different data types in a computer program.
3. Design programs involving decision structures, loops and functions.
4. Explain the difference between call by value and call by reference.
5. Ability to write Efficient programs with multitasking ability and handle exceptions.
6. Ability to solve problems using object oriented approach and implement them using C++.

**B.Tech III Semester** **COURSE CODE: UR19PCIT305** **L T P C**
**3 0 0 3**

# Computer Organization

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
2. In addition to this the memory management system of computer.

**UNIT -I:**
**Basic Structure Of Computers:** Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

**UNIT -II:**
**Machine Instruction and Programs:**
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions
**Type of Instructions:** Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

**UNIT -III:**
**INPUT/OUTPUT ORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

**UNIT -IV:**
**The MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,

**UNIT -V:**
**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, **Micro programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

**TEXT BOOKS:**
1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
3. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

**REFERENCE BOOKS:**
1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

4. “Computer Organization and Design: The Hardware/Software Interface” by David A. Patterson and John L. Hennessy.
5. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

**Course Outcomes:**

1. Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation
3. Understanding of different instruction types.
4. Students can calculate the effective address of an operand by addressing modes
5. They can understand how computer stores positive and negative numbers.
6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

**B.Tech III Semester** **COURSE CODE: UR19PCIT306** **L T P C**
**3 0 0 3**

# Mathematical Foundations of Computer Science

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2. To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

**UNIT -I:**

**Mathematical Logic**: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

**UNIT -II:**

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

**UNIT- III:**

**Algebraic Structures and Number Theory:** *Algebraic Structures:* Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:* Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

**UNIT -IV:**

**Combinatorics:** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

**Recurrence Relations:** Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

**UNIT -V:**

**Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

**TEXT BOOKS:**

1.Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

**REFERENCE BOOKS:**

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

**Course Outcomes:**

1. Student will be able to demonstrate skills in solving mathematical problems
2. Student will be able to comprehend mathematical principles and logic
3. Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
4. Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
5. Student will be able to communicate effectively mathematical ideas/results verbally or in writing
6. Ability to use logic and set theory to formulate precise statements
7. Ability to apply graph theory in solving computing problems

**B.Tech III Semester** **COURSE CODE: UR19PCITL301** **L T P C**
**0 0 3 1.5**

## Data Structures through C++ Lab

**Internal Marks: 20**
**External Marks: 30**

**Course Objectives:**

1. To develop skills to design and analyze simple linear and non linear data structures
2. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
3. To Gain knowledge in practical applications of data structures

**List of Experiments:**

1. Implementation of Singly linked list.
2. Implementation of Doubly linked list.
3. Implementation of Multistack in a Single Array.
4. Implementation of Circular Queue
5. Implementation of Binary Search trees.
6. Implementation of Hash table.
7. Implementation of Heaps.
8. Implementation of Breadth First Search Techniques.
9. Implementation of Depth First Search Techniques.
10. Implementation of Prim's Algorithm.
11. Implementation of Dijkstra's Algorithm.
12. Implementation of Kruskal's Algorithm
13. Implementation of MergeSort
14. Implementation of Quick Sort
15. Implementation of Data Searching using divide and conquer technique

**COURSE OUTCOMES:** At the end of this lab session, the student will

1. Be able to design and analyze the time and space efficiency of the data structure
2. Be capable to identity the appropriate data structure for given problem
3. Have practical knowledge on the application of data structures.
4. Ability to implement various searching and sorting techniques.
5. Ability to have knowledge of trees and graphs concepts.
6. Student will be able to write programs to implement stack, queue and linked list operation.

**Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.**

**In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted**.

**B.Tech III Semester** **COURSE CODE: UR19PCITL302** **L T P C**
**0 0 3 1.5**

## Python Programming Lab

**Internal Marks: 20**
**External Marks: 30**

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10

c) Write a program using a for loop that loops over a sequence. What is sequence ?

d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order. b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b. b) Write a function dups to find all duplicates in the list. c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers. b) Write a function reverse to reverse a list. Without using the reverse function. c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints b) Write a program to perform addition of two square matrices c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a) Install packages requests, flask and explore them. using (pip) b) Write a script that imports requests and fetch content from the page. Eg. (Wiki) c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

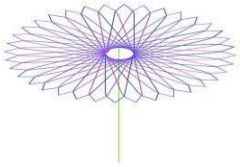
Exercise - 13 OOP

a) Class variables and instance variable and illustration of the self variable i) Robot ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk

2. Write a program to implement the following figures using turtle



Exercise - 15 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers b) Write a test-case to check the function reverse_string which returns the reversed string

Exercise - 16 - Advanced

a) Build any one classical data structure. b) Write a program to solve knapsack problem.

**Course Outcomes:**

At the end of this lab session, the student will learn

1. Student should be able to understand the basic concepts scripting and the contributions of scripting language.
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
3. Express different Decision Making statements and Functions.
4. Interpret Object oriented programming in Python.
5. Understand and summarize different File handling operations.
6. Explain how to design GUI Applications in Python and evaluate different database operations.

**Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.**

**In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.**

**B.Tech III Semester** **COURSE CODE: UR19MCIT301** **L T P C**
**0 0 0 0**

## Essence of Indian Traditional Knowledge

**Internal Marks: 100**

**Course Objectives:**

- The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
- Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.
- The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

Course Content :

Basic Structure of Indian Knowledge System (i) वेद, (ii) उत्तवेद (आयवुदे, धनवुदे, गन्धवदे, स्थात्तत्य आदद) (iii) वेदा◌ा◌ा◌ा ग (शिक्षा, कल्त्त, ननरुत, व्याकरण, ज्योनतष छा द), (iv) उत्ताइग (धर्म ि◌ा◌ा◌ास्त्र, र◌ा मकशर्◌ास्र)

Modern Science and Indian Knowledge System
Yoga and Holistic Health care
Case Studies.

Suggested Text/Reference Books

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

**Course Outcomes:**

- Ability to understand , connect up and explain basics of Indian Traditional knowledge modern scientific perspective

**B.Tech IV Semester** **COURSE CODE: UR19PCIT401** **L T P C**
**3 0 0 3**

# Java Programming

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. The main objective of this course is to understand the Object Oriented programming issues in developing more complex software designs.
2. Students will also learn the advantages of Object Oriented programming over the normal and old paradigm structured programming languages.
3. Examples which are demonstrated using java helps the students to understand the concepts and apply the features of Object Oriented programming.
4. The enhancements that are made in the latest certification exams for java are also kept in view. This helps students to keep their skills up to date.

**UNIT I:**

**Java Basics and Anatomy:**

Java Basics: OOP‟s principles, Java History, advantages, Data types, operators, expressions,control statements, methods and recursion, sample programs.

Java Anatomy: Java Objects and References, Constructors, this keyword, Arrays (single andmulti-dimensional), String and its immutability, Buffer &Builder Classes, String Tokenizer

**UNIT II:**

**Inheritance (Extending and Implementing):** Introduction, Derived Classes, Advantages andTypes of Inheritance, Implementation, Inheritance and Member Accessibility. Overriding, Super,Abstract classes and Methods, Final Classes and Final Methods, Dynamic Binding,Polymorphism.

Interfaces: differences between classes and interfaces, defining an interface, implementinginterface, variables in interface, extending interfaces.

**UNIT III:**

**Packaging and Java API**

Packages: Defining, Creating and Accessing a Package, importing packages, access controls(public, protected, default, and private). Wrapper Classes and Auto Boxing, I/O classes

Collections Framework: Object class, importance of methods like hash code ( ) and equals ( ).Array List, application of Comparable and Comparator interfaces.

**UNIT IV:**

**Exception handling and Multithreading:**Concepts of exception handling, benefits of exception handling, usage of try, catch, throw,throws and finally, built in exceptions, creating own exception. Threads: Thread life cycle,creating threads, synchronizing and Communication of threads.

**UNIT-V:**

**Applet** class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Handling: Events, Event Delegation Model, Event classes, Listeners, handling mouse and keyboard events. adapter classes, inner classes.

**Graphical User Interaction:** Swings- Introduction, limitations of AWT, components,containers, exploring swing-Frame and JComponent, Icons and Labels, text fields.Layout managers– border, grid, flow.

**Text Book:**

1. Java Fundamentals, a Comprehensive Introduction, Herbert Schildt& Dale Skrien, 2013,McGraw-Hill.

**Reference Books:**

1. Introduction to Java Programming 7/e, Brief version, Y.Daniel Liang, Pearson

2. Thinking in Java 4E: Bruce Eckel, Pearson

3. The Java™ Programming Language: Ken Arnold, James Gosling, Pearson.

**Course Outcomes:**

At the end of this course student will:

1. Understand the key features of the Java programming language

2. Apply essential object-oriented programming concepts like dynamic polymorphism, abstract (virtual) methods using Java

3. Apply the principles behind good object-oriented design.

4. Get exposure to the latest trends in java language and its compatibility in handling numerous complex domains.

5. Create user friendly interface.

6. Ability to handle Exceptions

**B.Tech IV Semester** **COURSE CODE: UR19PCIT402**

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# Operating Systems

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

**UNIT I:**

**Computer System and Operating System Overview:** Operating System Objectives & Functions,Computer System Organization & Architecture, Operating System Structure & Operations.

System Structure: OS Services, System Calls, Types of system calls.

**UNIT-II:**

**Process Management:** Process Concept, Process scheduling, Operations on processes, CoOperating Processes, Interprocess Communication.

**Threads:** Overview, Multithreading Models, user and kernel threads.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (FCFS, SJF,Priority, RR).

**UNIT-III:**

**Process Synchronization**: Critical Section Problem, Peterson‟s Solution SynchronizationHardware, Semaphores, Classical problems of synchronization, Monitors.

**UNIT-IV:**

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks,Deadlock Prevention, Deadlock Avoidance (including Banker‟s Algorithm), Deadlock Detection& Recovery

Memory Management: Logical vs. physical address space, Swapping, Contiguous MemoryAllocation, Paging, Structure of the Page Table, Segmentation.

**UNIT-V:**

**Virtual Memory Management**: Page fault, Demand Paging, Performance, Page Replacement &its Algorithms (FIFO, LRU Optimal, Clock), Allocation of frames, Thrashing

**File System:** File Concept, Access Methods, Directory & Disk Structure, File System Structure,Directory Implementation (linear list, hash table), and Allocation methods (contiguous, linked,and indexed).

Disk Management: Overview of Mass Storage Structure, Disk Scheduling (FCFS, SSTF, SCAN,C-SCAN)

**Text Book:**

1 Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne,8thEdition,John Wiley.

**Reference Books:**

1. Operating Systems‟ – Internal and Design Principles -- Stallings, Sixth Edition,Pearsoneducation.
2. Operating System Design & Implementation -- Tanenbaum A.S. -- PHI
3. Operating Systems -- Stalling, William -- Maxwell McMillan InternationalEditions.
4. An Introduction to Operating Systems -- Dietel H. N., -- Addison Wesley.
5. Advanced programming in the UNIX environment -- W.Richard Stevens –pearsonEducation
6. UNIX and Shell Programming -- Behrouz A. Forouzan, Richard F. Gilberg.

**Course Outcomes:**

At the end of this course student will:

1. Understand the structure and functionalities of Operating System
2. Apply CPU scheduling algorithms, deadlock prevention and detection algorithms and different page replacement algorithms
3. Illustrate different problems and solutions related to process synchronization
4. Describe the concepts of paging and segmentation for memory management
5. Analyze the operating system support for virtual memory, disk management.
6. Evaluate the requirement for process synchronization and coordination handled by operating system.
7. Identify use and evaluate the storage management policies with respect to different storage management technologies.
8. Identify the need to create the special purpose operating system.

**B.Tech IV Semester** **COURSE CODE: UR19PCIT403** **L T P C**
**3 0 0 3**

# Data Base Management Systems

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. The main objective of this course is to enable students to the fundamental concepts of database analysis and design.

2. To recognize the importance of database analysis and design in the implementation of any Database application and to understand the process of drawing the ER-Diagrams.

3. It also gives the knowledge of the roles of transaction processing and concurrency control.

**UNIT I:**

**Introduction to Databases:** Characteristics of the Database Approach, Advantages of using the DBMS Approach, A Brief History of Database Applications.

Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, Database System environment, Centralized and Client-Server Architecture for DBMS.

**UNIT II:**

**Relational Model:** The Relational Model Concepts, Relational Model Constraints and Relational Database Schemas.

**SQL:** Data Definition, Constraints, and Basic Queries and Updates, Views(Virtual Tables) in SQL.

**UNIT III:**

**Conceptual Data Modeling :** High-Level Conceptual Data Models for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types.

**ER-Diagrams:** Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher Than Two.

**UNIT-IV:**

**Database Design Theory:** Functional Dependencies, Normal forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form. Fourth Normal Form

**Transaction Processing:** Introduction, Transaction and System Concepts, Desirable Properties of Transactions.

**UNIT V:**

**Introduction to Protocols for Concurrency Control in Databases:** Two-Phase Locking Techniques for Concurrency Control-Types of Locks and System Lock Tables.

Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

**Text Books:**

1. DATABASE SYSTEMS Models, Languages, Design and Application Programming, 6th Edition, RamezElmasri , Shamkant B.Navathe , Pearson.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition

**References Books:**

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education3. Introduction to Database Systems, C.J.Date Pearson Education

**Course Outcomes:** At the end of this course student will

1. Understand the basic principles of database management systems.
2. Draw Entity-Relationship diagrams to represent simple database application scenarios
3. Write SQL queries for a given context in relational database.
4. Discuss normalization techniques with simple examples.
5. Describe transaction processing and concurrency control concepts.
6. Ability to understand in detail about normal forms.
7. Design and build database system for a given real world problem.

**B.Tech IV Semester** **COURSE CODE: UR19PCIT404** **L T P C**
**3 0 0 3**

# Formal Languages and Automata Theory

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

1. To understand the fundamental models of computation
2. To determine Chomsky classification of languages.
3. To classify machines by their power to recognize language
4. Understand the concepts of decidability, NP-Completeness and NP Hard Problems

**UNIT I:**

**Fundamentals of Automata**– Computation, Finite State Machine, Components of Finite State Automata, Elements of Finite State System ,Mathematical representation of Finite State Machine, Automata Classification, Automata in Real World

**UNIT II:**

**Fundamentals:** Strings, Alphabet, Language, Operations, Chomsky hierarchy of languages Finite state machine: Definitions, finite automation model, acceptance of strings and languages, DFA and NFA, transition diagrams and language recognizers. NFA with ε transitions –Equivalence between NFA with and without ε transitions, NFA to DFA conversion, minimization FSM, equivalence between two FSM‟s, Output machines- Moore and Mealy machine.

**UNIT III:**

**Regular Languages :** Regular Sets , Regular Expressions , identity Rules, Constructing Finite automata for a given regular expressions, Conversion of Finite automata to regular expressions, Pumping lemma of regular sets , closure properties of regular sets (proofs not required).Regular Grammars – right linear and left linear grammars, equivalence between regular grammar and FA.

**UNIT IV:**

**Context Free Grammar:** derivation trees, sentential forms, right most and left most derivations of strings, Ambiguity in Context free Grammars, Minimization of Context free grammars, CNF,GNF, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).Push down Automata: definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence

**UNIT V:**

**Equivalence of CFL and PDA (proofs not required),** Introduction to DCFL and DPDA. Turing Machine: Definition, model, Design of TM, computable functions, recursively enumerable languages. Church‟s hypothesis, counter machine, types of Turing Machines (proofs not required)

**Computability Theory**: Decidability of problems, Universal TM, Un decidable problems about Turing Machine – Post‟s Correspondence Problem - The classes P and NP.

**Text Books:**

1. Formal Languages and Automata Theory by Basavarj S. Anami, Karibasappa K.G,WILEY-INDIA

2. H.E. Hopcroft, R. Motwani and J.D Ullman, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2003.

3.A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press

**Reference Books:**

1. Theory of Computer Science, Automata languages and computation, 2/e,Mishra, Chandra Shekaran, PHI

2. H.R. Lewis and C.H. Papadimitriou, “Elements of The theory of Computation”, Second Edition, Pearson Education/PHI, 2003

3. J.C.Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, TMH, 2003.

4. Michael Sipser, “Introduction of the Theory and Computation”, Thomson Brokecole, 1997.

**Course Outcomes:**

At the end of this course student will:

1. Analyze and design Finite Automata

2. Classify the devices according to their computational power

3. Understand the concept of the Formal grammars and languages

4. Understand Turing machine concept and the techniques applied in computers

5. Understand basic complexity classes like P & NP.

6. Employ finite state machines to solve problems in computing,

7. Explain deterministic and non-deterministic machines,

8. Comprehend the hierarchy of problems arising in the computer science

**B.Tech IV Semester** **COURSE CODE: UR19BSC401** **L T P C**
**3 0 0 3**

## Statistics with R Programming

**Internal Marks: 30**
**External Marks: 70**

**Course Objectives:**

After taking the course, students will be able to

• Use R for statistical programming, computation, graphics, and modeling,

• Write functions and use R in an efficient way,

• Fit some basic types of statistical models

• Use R in their own research,

• Be able to expand their knowledge of R on their own.

**UNIT-I:**
**Introduction,** How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

**UNIT-II:**
**R Programming Structures**, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

**UNIT-III:**
**Doing Math and Simulation in R**, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

**UNIT-IV:**
**Graphics**, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files. Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

**UNIT-V:**
**Linear Models**, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

**TEXT BOOKS:**

1) The Art of R Programming, Norman Matloff, Cengage Learning

2) R for Everyone, Lander, Pearson

**REFERENCE BOOKS:**

1) R Cookbook, PaulTeetor, Oreilly.

2) R in Action,Rob Kabacoff, Manning

**Course Outcomes:**

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

1. List motivation for learning a programming language
2. Access online resources for R and import new function packages into the R workspace
3. Import, review, manipulate and summarize data-sets in R
4. Explore data-sets to create testable hypotheses and identify appropriate statistical tests
5. Perform appropriate statistical tests using R Create and edit visualizations with
6. Extend the functionality of R by using add-on packages.
7. Apply R Graphics and Tables to visualize results of various statistical operations on data.

**B.Tech IV Semester** **COURSE CODE: UR19PCITL401** **L T P C**
**0 0 3 1.5**

## Java Programming Lab

**Internal Marks: 20**
**External Marks: 30**

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on public static void main(250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements using bubble sort

c). Write a JAVA program to sort for an element in a given list of elements using merge sort.

d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a). Write a JAVA program to implement Single Inheritance

b). Write a JAVA program to implement multi level Inheritance

c). Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

a). Write a JAVA program give example for “super” keyword.

b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a).Write a JAVA program that describes exception handling mechanism

b).Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

b). Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

a). Write a JAVA program for creation of Illustrating throw

b). Write a JAVA program for creation of Illustrating finally

c). Write a JAVA program for creation of Java Built-in Exceptions

d).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)

b). Write a program illustrating isAlive and join ()

c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem

b).Write a case study on thread Synchronization after solving the above producer consumer problem

Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package.

c). Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to display analog clock using Applet.

c). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a).Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

a).Write a JAVA programto build a Calculator in Swings

b). Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)

a). Write a JAVA program that to create a single ball bouncing inside a JPanel.

b). Write a JAVA program JTree as displaying a real tree upside down.

## Course Out comes:

At the end of this lab session students will learn

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.

2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem

3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

4. Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.

5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.

6. Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.

**Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.**

**In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.**

**B.Tech IV Semester** **COURSE CODE: UR19PCITL402** **L T P C**
**0 0 3 1.5**

# Unix Operating System Lab

**Internal Marks: 20**
**External Marks: 30**

**Course Objectives:**

• To understand the design aspects of operating system.

• To study the process management concepts & Techniques.

• To study the storage management concepts.

• To familiarize students with the Linux environment

• To learn the fundamentals of shell scripting/programming

• To familiarize students with basic Unix administration

**Operating Systems**

1. Simulate the following CPU scheduling algorithms

a) Round Robin b) SJF c) FCFS d) Priority

2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls

3. Simulate the following

a) Multiprogramming with a fixed number of tasks (MFT)

b) Multiprogramming with a variable number of tasks (MVT)

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention.

6. Simulate the following page replacement algorithms.

a) FIFO b) LRU c) LFU

7. Simulate the following File allocation strategies

a) Sequenced b) Indexed c) Linked

**UNIX Programming**

List of Experiments:

1. Basic Shell Commands Shell Programs:

2. Fibonacci Series

3. Designing Calculator

4. File Operations

5. Base conversion

6. Usage of cut and grep commands
7. Usage of user defined functions Administration
8. Managing User Accounts
9. User Quota Management
10. Installation of RPM software and Zipping, tar
11. Configuring RAID
12. Configuring Web server

**Course Outcomes:**

At the end of this lab session students will able to

1. To use Unix utilities and perform basic shell control of the utilities
2. To use the Unix file system and file access control.
3. To use of an operating system to develop software
4. Work confidently in Unix/Linux environment
5. Write shell scripts to automate various tasks
6. Master the basics of Linux administration

**Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.**

**In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.**

**B.Tech IV Semester** **COURSE CODE: UR19PCITL403** **L T P C**
**0 0 3 1.5**

## Data Base Management Systems Lab

**Internal Marks: 20**
**External Marks: 30**

**Course Objectives:**

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product specific tools.
2. To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
3. To give a good formal foundation on the relational model of data
4. To present SQL and procedural interfaces to SQL comprehensively
5. To give an introduction to systematic database design approaches covering, conceptual design, logical design and an overview of physical design

Note: The creation of sample database for the purpose of the experiments is expected to be pre decided by the instructor.

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
4. Queries using Group By, Order By, and Having Clauses
5. Queries on Controlling Data: Commit, Rollback, and Save point
6. Queries to Build Report in SQL *PLUS
7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
8. Queries on Joins and Correlated Sub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

16. Demonstration of database connectivity

**Text Books:**

1. Oracle: The Complete Reference by Oracle Press

2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.

3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

**Course Outcomes:**

At the end of this lab session students will able to

1. Understand, appreciate and effectively explain the underlying concepts of database technologies
2. Design and implement a database schema for a given problem-domain
3. Normalize a database
4. Populate and query a database using SQL DML/DDL commands.
5. Declare and enforce integrity constraints on a database using a state-of-the-artRDBMS
6. Programming PL/SQL including stored procedures, stored functions, cursors, packages.
7. Design and build a GUI application using a 4GL

**Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations.**

**In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.**

**B.Tech IV Semester** **COURSE CODE: UR19MC401** **L T P C**
**0 0 0 0**

## Professional Ethics & Human Values

**Internal Marks: 100**

**Course Objectives:**

- To give basic insights and inputs to the student to inculcate Human values to grow as aresponsible human beings with proper personality.
- Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

**UNIT I:**

**Human Values**: Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning –Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage –Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

**UNIT: II:**

**Principles for Harmony:** Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights –Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias – Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

**UNIT III:**

**Engineering Ethics and Social Experimentation:** History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

**UNIT IV:**

**Engineers' Responsibilities towards Safety and Risk:** Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects – Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

**UNIT V:**

**Engineers' Duties and Rights:** Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective

Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing.

**Text Books:**

1. Ethics in Engineering, Mike Martin and Roland Schinzinger, McGraw Hill. New York 1996.

2. Ethics in Engineering Practice and Research, Caroline Whitbeck, Elsevier.

3. Engineering Ethics, Govindarajan. M, Natarajan. S, Senthilkumar. V.S, Prentice Hall of India, 2004.

**Reference Books:**

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.

2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.

3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana – Maruthi Publications.

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.

5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd.,Noida.

6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.

7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M.Jayakumaran – University Science Press.

8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013

9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

**Course Outcomes:**

1. Exposed awareness on professional ethics and human values.
2. It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
3. It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
4. Known their role in technological development
5. Learn the moral issues and problems in engineering; find the solution to those problems.
6. Gain exposure to Environment Ethics & computer ethics; know their responsibilities and rights

| B.Tech. IV & V Semester | COURSE CODE: UR19MPROJIT401, UR19MPROJIT501 | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 0 |

# SOCIALLY RELEVANT MINI PROJECT-I & II

Internal Marks: 20
Semester-end Marks: 30
External Marks: 0

**Guidelines:**

- Students should select a problem which addresses real life applications.
- Group of maximum three students can be permitted to work on a single mini project.
- Student should select the current trending technologies to develop the project.
- The mini project can be either mobile/web based applications.
- Student should know the functional requirements, existing system and proposed system of the project.
- Student should have the knowledge about the algorithms that are going to apply for the project.
- At the end of the project, students should be able to run the project in any Operating System.
- Student should be able to find the bugs and fix.
- 10-20 pages report to be submitted by students.
- Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.