# M R C E T C A M P U S

## (Autonomous Institution – UGC, Govt. of India)

# BACHELOR OF TECHNOLOGY (B.Tech)

# CSE (AI & ML)

## COURSE STRUCTURE & SYLLABUS (R20)

### (Batches admitted from the academic year 2020 - 2021)

## DEPARTMENT OF
## COMPUTER SCIENCE & ENGINEERING
### (EMERGING TECHNOLOGIES)

## M R C E T CAMPUS

**(Autonomous Institution – UGC, Govt. of India)**

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – _A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.
Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

## PRELIMINARY DEFINITIONS AND NOMENCLATURES

➢ Autonomous Institution /College‖- means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

➢ Academic Autonomy -‖means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

➢ Commission - means University Grants Commission.

➢ AICTE - means All India Council for Technical Education.

➢ University - The Jawaharlal Nehru Technological University, Hyderabad.

➢ College – means M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA, Secunderabad unlessindicated
otherwise by the context.

➢ Program - means:
  ▪ Bachelor of Technology (B.Tech) degree program
  ▪ UG Degree Program: B.Tech

➢ Branch means specialization in a program  like  B.Tech degree program in Computer Science and Engineering, B.Tech degree  program  in Electronics & Communication Engineering etc.

➢ Course or Subject means a theory or practical subject, identified by its course–number and course-
title, which is normally studied in a semester.

➢ T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

## FOREWORD

The autonomy is conferred on M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms ofthe monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.
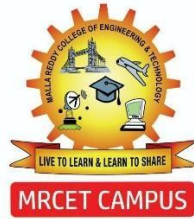
M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA (MRCET CAMPUS) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council andBoards of Studiesare constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institutionin order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

*"A thought beyond the horizons of success committed for educational excellence"*

**PRINCIPAL**

# M R C E T CAMPUS
## (Autonomous Institution – UGC, Govt. of India)

VISION

❖ To acknowledge quality education and instill high patterns of discipline making the students
technologically superior and ethically strong which involves the improvement in the quality of
life in human race.

MISSION

❖ To achieve and impart holistic technical education using the best of infrastructure, outstanding
technical and teaching expertise to establish the students into competent and confident
engineers.

Evolving the center of excellence through creative and innovative teaching learningpractices for

promoting academic achievement to produce internationally accepted competitive and world class

professionals.

QUALITY POLICY

❖ To pursue continual improvement of teaching learning process of Undergraduate and Post

Graduate programs in Engineering & Management vigorously.

❖ To provide state of art infrastructure and expertise to impart the quality education.

For more information: www.mrcet.ac.in

# BACHELOR OF TECHNOLOGY (B.Tech)

# AI & ML

# COURSE STRUCTURE & SYLLABUS (R20)

**(Batches admitted from the academic year 2020 - 2021)**

# M R C E T CAMPUS

**AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**

(Autonomous Institution – UGC, Govt. of India)

## COURSE STRUCTURE & SYLLABUS

## INDEX

**M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA**

**COURSE STRUCTURE BTECH- CSE (AI&ML)**

### I B. Tech – I Semester (I Year I Semester)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAX. MARKS INT | MAX. MARKS EXT |
|---|---|---|---|---|---|---|---|---|
| 1 | R20A0001 | English | 2 | 0 | 0 | 2 | 30 | 70 |
| 2 | R20A0021 | Mathematics – I | 3 | 1 | 0 | 4 | 30 | 70 |
| 3 | R20A0201 | Basic Electrical Engineering | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0301 | Computer Aided Engineering Graphics | 2 | 0 | 2 | 3 | 30 | 70 |
| 5 | R20A0501 | Programming for Problem Solving | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | R20A0081 | English Language Communication Skills Lab | - | 0 | 4 | 2 | 30 | 70 |
| 7 | R20A0281 | Basic Electrical Engineering Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A0581 | Programming for Problem Solving Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 9 | R20A0003* | Human Values  and Professional  Ethics | 2 | 0 | 0 | 0 | 100 | - |
| | | **TOTAL** | **15** | **1** | **12** | **20** | **340** | **560** |

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

### I B. Tech– I Semester (I Year II Semester)

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAX. MARKS INT | MAX. MARKS EXT |
|---|---|---|---|---|---|---|---|---|
| 1 | R20A0002 | Professional English | 2 | 0 | 0 | 2 | 30 | 70 |
| 2 | R20A0022 | Mathematics – II | 3 | 1 | 0 | 4 | 30 | 70 |
| 3 | R20A0011 | Applied Physics | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0401 | Analog and Digital Electronics | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | R20A0502 | Python Programming | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | R20A0082 | Applied Physics Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 7 | R20A0582 | Python Programming Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A0083 | Engineering and IT Workshop | - | 0 | 4 | 2 | 30 | 70 |
| 9 | R20A0014* | Environmental Science | 2 | - | - | 0 | 100 | - |
| | | **TOTAL** | **16** | **1** | **10** | **20** | **340** | **560** |

***Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

**II B. Tech – III Semester (II Year I Semester)**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAX. MARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A0503 | Data Structures Using Python | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | R20A0504 | Operating Systems | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | R20A0411 | Computer Organization & Architecture | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0024 | Probability & Statistics | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | R20A0505 | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | R20A0061 | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 | 30 | 70 |
| 7 | R20A0583 | Data Structures using Python Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A0584 | Operating Systems Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 9 | R20A0004* | Foreign Language: French | 2 | - | - | 0 | 100 | - |
| | | **TOTAL** | **20** | **0** | **6** | **21** | **340** | **560** |

**\*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

**II B. Tech – IV Semester (II Year II Semester)**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAX. MARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A0026 | Discrete Mathematics | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | R20A0507 | Formal Languages and Automata Theory | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | R20A0508 | Object Oriented Programming through Java | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0509 | Database Management Systems | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | R20A0513 | Artificial Intelligence | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | OE-I | Open Elective-I | 3 | 0 | 0 | 3 | 30 | 70 |
| 7 | R20A0585 | Object Oriented Programming through Java Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A0586 | Database management Systems Lab | - | 0 | 3 | 1.5 | 30 | 70 |
| 9 | R20A0008 | Global Education & Professional Career | 2 | - | - | 0 | 100 | - |
| | | **TOTAL** | **20** | **0** | **6** | **21** | **340** | **560** |

**\*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

Malla Reddy College of Engineering and Technology (MRCET CAMPUS)

| OPEN ELECTIVE I | | |
|---|---|---|
| S.NO | SUBJECT CODE | SUBJECT |
| 1 | R20A1251 | WEB DESIGNING TOOLS |
| 2 | R20A0551 | INTRODUCTION TO DBMS |
| 3 | R20A0351 | INTELLECTUAL PROPERTY RIGHTS |
| 4 | R20A0051 | ENTERPRISE RESOURCE PLANNING |
| 5 | R20A0451 | BASICS OF COMPUTER ARCHITECTURE |

**III Year B. Tech– V Semester (III Year I-Semester)**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAX. MARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A0511 | Software Engineering | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | R20A0510 | Computer Networks | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | R20A0512 | Compiler Design | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0518 | Machine Learning | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | R20A6601 R20A0515 R20A0527 | Professional Elective-I 1.Image Processing 2.Text Analytics 3. Scripting Languages | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | OE-II | Open Elective-II | 3 | 0 | 0 | 3 | 30 | 70 |
| 7 | R20A6681 | Artificial Intelligence & Machine Learning Lab | 0 | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A0587 | Compiler Design & Case Tools lab | 0 | 0 | 3 | 1.5 | 30 | 70 |
| 9 | R20A0006* | Technical Communication & Soft Skills | 2 | - | - | 0 | 100 | - |
| | | TOTAL | 20 | 0 | 6 | 21 | 340 | 560 |

**\*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

| OPEN ELECTIVE II | | |
|---|---|---|
| S.NO | SUBJECT CODE | SUBJECT |
| 1 | R20A1252 | MANAGEMENT INFORMATION SYSTEMS |
| 2 | R20A0552 | JAVA PROGRAMMING |
| 3 | R20A1253 | SOFTWARE PROJECT MANAGEMENT |
| 4 | R20A0452 | INTERNET OF THINGS & ITS APPLICATIONS |
| 5 | R20A0553 | OPERATING SYSTEM CONCEPTS |

**III Year B. Tech – VI Semester (III Year II Semester)**

| S.NO | Subject Code | SUBJECT | L | T | P | C | MAX. MARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A0526 | Neural Networks | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | R20A0533 | Data Warehousing and Data Mining | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | R20A0517 | Full Stack Web Development | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A6691 | Mini Project | - | - | 6 | 3 | 30 | 70 |
| 5 | R20A6603 R20A6202 R20A6604 | Professional Elective-II 1. Game Programming 2. Cyber security 3. Computer Vision | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | OE-III | Open Elective-III | 3 | 0 | 0 | 3 | 30 | 70 |
| 7 | R20A0589 | Full Stack Web Development Lab | 0 | 0 | 3 | 1.5 | 30 | 70 |
| 8 | R20A1282 | Data warehouse and Data Mining Lab | 0 | 0 | 3 | 1.5 | 30 | 70 |
| 9 | R20A0007* | Constitution of India | 2 | - | - | 0 | 100 | - |
| | | **TOTAL** | **17** | **0** | **12** | **21** | **340** | **560** |

**\*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree**

| OPEN ELECTIVE III | | |
|---|---|---|
| S.NO | SUBJECT CODE | SUBJECT |
| 1 | R20A0453 | ROBOTICS & AUTOMATION |
| 2 | R20A1254 | BIG DATA ARCHITECTURE |
| 3 | R20A0554 | INFORMATION SECURITY |
| 4 | R20A0555 | CLOUD COMPUTING FUNDAMETALS |
| 5 | R20A1255 | DEV-OPS |

**IV Year – VII Semester (IV Year I Semester)**

| S.No | Subject Code | SUBJECT | L | T | P | C | MAX. MARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A6605 | Cognitive computing | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | R20A0521 | Natural Language Processing | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | R20A6705 | Deep Learning | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | R20A0520 R20A0528 R20A0523 | Professional Elective-III 1. Distributed Systems 2. Software Testing Methodologies 3. Big Data Analytics | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | R20A0529 R20A0530 R20A0524 | Professional Elective-IV 1.Microservices 2. IT Service Management and Automation 3.Cloud Computing | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | R20A6694 | Major Project Phase-1 | - | - | 6 | 3 | 30 | 70 |
| 7 | R20A6783 | Deep Learning Lab | - | - | 3 | 1.5 | 30 | 70 |
| 8 | R20A6683 | Natural Language Processing Lab | - | - | 3 | 1.5 | 30 | 70 |
| | | TOTAL | 15 | 0 | 12 | 21 | 240 | 560 |

**IV Year B. Tech – VIII Semester (IV Year II Semester)**

| S.NO | SUBJECT CODE | SUBJECT | L | T | P | C | MAXMARKS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | INT | EXT |
| 1 | R20A6695 | Start-up & Innovation | - | - | 8 | 4 | 30 | 70 |
| 2 | R20A0596 | Entrepreneurship | - | - | 6 | 3 | 30 | 70 |
| 3 | R20A6696 | Major Project /Project Phase 2 | - | - | 16 | 8 | 30 | 70 |
| | | TOTAL | - | - | 30 | 15 | 90 | 210 |

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**I Year B.Tech. CSE(AI&ML)- I Sem**            **L/T/P/C**
                                                **2/-/-/2**

| (R20A0001) ENGLISH |
|---|

## INTRODUCTION

English is a global language, which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected excerpts support as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

## OBJECTIVES

1. To enable students to enhance their lexical, grammatical and communicative competence.

2. To equip the students to study the academic subjects with better perspective throughtheoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing and to ensure error-free writing.
4. To analyze, interpret and evaluate a text and critically appreciate it.
5. To improve the writing and speaking skills, the productive skills.

## SYLLABUS
**Reading Skills:**
**Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To augment the ability of students to guess the meanings of words from context and grasp theoverall message of the text, draw inferences etc.Skimming the text
   - Understanding the gist of an argument        • Identifying the topic sentence
   - Inferring lexical and contextual meaning       • Understanding discourse features
     Recognizing coherence/sequencing of sentences • Scanning the text

## NOTE:
The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

**Writing Skills:**

**Objectives**

1. To develop an awareness in the students about basic formal writing skills.

2. To equip students with the components of different forms of writing, beginning with the required ones:
   - Writing sentences
   - Use of appropriate vocabulary
   - Coherence and cohesiveness
   - Formal and informal letter writing

**Unit –I**

**"The Road not taken"by Robert Frost**

Grammar –Tenses and Punctuation (Sequences of Tenses)Vocabulary –Word Formation - Prefixes and Suffixes Writing –Paragraph Writing (Focusing on Tenses and Punctuations) Reading – The art of skimming and scanning -Reading Exercise Type 1(Match the statements to the text they refer to)

**Unit – II**

**Act II from 'Pygmalion' by G.B. Shaw**

Grammar –Direct and Indirect Speech Vocabulary– Synonyms, Antonyms

Writing–Essay Writing (Introduction, body and conclusion)

Reading –Comprehending the context– Reading Exercise Type 2(Place the missing statement)

**Unit – III**

**Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft**

Grammar – Voices

Vocabulary –One-Word Substitutes, Standard Abbreviations

Writing –E-mail Writing, Letter Writing (complaints, requisitions, apologies).

Reading        –Reading Comprehension- Reading Exercise Type 3
      (Reading between the lines)

**Unit – IV**

**J K Rowling's Convocation Speech at Harvard** Grammar –Articles, Misplaced Modifiers Vocabulary –Phrasal Verbs

Writing – Précis Writing

Reading        –Reading Exercise Type 4(Cloze test)

**Unit –V**

**Abdul Kalam's Biography**

Grammar – Subject-Verb Agreement, Noun-Pronoun Agreement Vocabulary –Commonly Confused Words

Writing –Memo Writing

Reading        –Reading Exercise Type 5(Identifying errors)

* Exercises apart from the textbook shall also be used for classroom tasks.

## REFERENCE BOOKS

1.    Practical English Usage. Michael Swan. OUP. 1995.
2.    Remedial English Grammar. F.T. Wood. Macmillan.2007
3.    On Writing Well. William Zinsser. Harper Resource Book. 2001
4.    Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5.    Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
6.    Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

## COURSE OUTCOMES

Students will be able to:

1.    Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2.    Hone their language abilities in terms of comprehending complex technical texts  with a potential to review literature
3.    Present ideas clearly and logically to analyze data and provide valid conclusions in writtencommunication
4.    Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5.    Represent old conventions with a set of the new by professional verbal communicative ability

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**I Year B.Tech. CSE(AI&ML)- I Sem** L/T/P/C
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| (R20A0021) MATHEMATICS –I |
|---|

**COURSE OBJECTIVES:**
1. The concept of a Rank of the matrix and applying the concept to know the consistency andsolving the system of linear equations.
2. The concept of Eigen values, Eigen vectors and Diagonolisation.
3. The maxima and minima of functions of several variables.
4. The Applications of first order ordinary differential equations and methods to solve higherorder differential equations.
5. The properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem.

**UNIT I: Matrices**
Introduction, Rank of a matrix - Echelon form, Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss-Siedel method, Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem(without proof), Diagonolisation of a matrix.

**UNIT II: Multi Variable Calculus (Differentiation)**
Functions of two variables, Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

**UNIT III:First Order Ordinary Differential Equations**
Exact, Equations reducible to exact form, Applications of first order differential equations - Newton's law of cooling, Law of natural growth and decay, Equations not of first degree-Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

**UNIT IV: Differential Equations of Higher Order**
Linear differential equations of second and higher order with constant coefficients: Non-homogeneous term of the type $f(x) = e^{ax}$, sinax, cosax, $x^n$, $e^{ax}$ V and $x^n$ V - Method of variation of parameters, Equations reducible to linear ODE with constant coefficients-Cauchy's Euler equation and Legendre's equation.

**UNIT V: Laplace Transforms**
Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms, Existence of Laplace transform, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.
Inverse Laplace transform by Partial fractions, Inverse Laplace transform of functions when they are multiplied and divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem, Solving ordinary differential equations by Laplace transform.

**TEXT BOOKS**
1. Higher Engineering Mathematics by B V Ramana. Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics by Kreyszig, JohnWiley &Sons.

**REFERENCE BOOKS**
1. Advanced Engineering Mathematics by R.K Jain & S R K Iyengar, Narosa Publishers.
2. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
3. Engineering Mathematics by N.P Bali and Manish Goyal.

**COURSE OUTCOMES**:
 After learning, the concepts of this paper the student will be able to
1.      Analyze the solutions of the system of linear equations and find the Eigen values and Eigen vectors of a matrix, which are used to analyze the long term behavior of any system.
2. Find the extreme values of functions of two variables with / without constraints.
3. Solve first order, first degree differential equations and their applications.
4. Form a differential equation for typical engineering problems and hence can solve those higher order differential equations.
5. Solve differential equations with initial conditions using Laplace Transformation.

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**I Year B.Tech. CSE(AI&ML)- I Sem** **L/T/P/C**
**3/-/-/3**

**(R20A0201) BASIC ELECTRICAL ENGINEERING**

**COURSE OBJECTIVES:**
1. To understand the basic concepts of electrical circuits & networks and their analysis which isthe foundation for all the subjects in the electrical engineering discipline.
2. To emphasize on the basic elements in electrical circuits and analyze Circuits using Network Theorems.
3. To analyze Single-Phase AC Circuits.
4. To illustrate Single-Phase Transformers and DC Machines.
5. To get overview of basic electrical installations and calculations for energy consumption.

**UNIT –I:**

**Introduction to Electrical Circuits:** Concept of Circuit and Network, Types of elements, R-L-C Parameters, Independent and Dependent sources, Source transformation and Kirchhoff's Laws

**UNIT –II:**

**Network Analysis:** Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta and Delta-to-Star Transformations for Resistive Networks, Mesh Analysis, and Nodal Analysis,

**Network Theorems:** Thevenin's theorem, Norton's theorem, MaximumPower Transfer theorem and Superposition theorem, Illustrative Problems.

**UNIT-III:**

**Single Phase A.C. Circuits:** Average value, R.M.S. value, form factor and peak factor for sinusoidal wave form. Steady State Analysis of series R-L-C circuits.Concept of Reactance, Impedance, Susceptance, Admittance, Concept of Power Factor, Real, Reactive and Complex power and Illustrative Problems.

**UNIT –IV:**

**Electrical Machines** (elementary treatment only):
Single phase transformers: principle of operation, constructional features and emf equation. DC.Generator: principle of operation, constructional features, emf equation. DC Motor: principle of operation, Back emf, torque equation.

**UNIT –V:**

**Electrical Installations:**
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and battery backup.

**TEXT BOOKS**:
1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.
3. Electrical Machines – P.S.Bimbra, Khanna Publishers.

**REFERENCE BOOKS:**

1. Network analysis by M.E Van Valkenburg, PHI learning publications.

2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.

3. Electrical Circuits by A. Sudhakar, Shyammohan and S Palli, Mc Graw Hill Companies.

4. Electrical Machines by I.J. Nagrath & D. P. Kothari, Tata Mc Graw-Hill Publishers.

**COURSE OUTCOMES:**

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

1. Apply the basic RLC circuit elements and its concepts to networks and circuits.
2. Analyze the circuits by applying network theorems to solve them to find various electrical parameters.
3. Illustrate the single-phase AC circuits along with the concept of impedance parameters and power.
4. Understand the Constructional Details and Principle of Operation of DC Machines and Transformers
5. Understand the basic LT Switch gear and calculations for energy consumption.

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**I Year B.Tech. CSE(AI&ML)- I Sem**          **L/T/P/C**
**2/-/2/3**

### (R20A0301) COMPUTER AIDED ENGINEERING GRAPHICS

**COURSE OBJECTIVES:**
1. To learn basic engineering graphic communication skills & concept.
2. To learn the 2D principles of orthographic projections and Multiple views of the same
3. To know the solid Projection and its Sectional Views
4. To gain the capability of designing 3D objects with isometric principles by using computer aided sketches
5. To know the conversion of Orthographic Views to isometric Views and isometric to Orthographic views

**UNIT-I**
**Introduction to Computer Aided Engineering Graphics**
Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning & free hand practicing. AutoCAD User Interface – Menu system – coordinate systems, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse– tool bars (draw, modify, annotations, layers etc.) – status bar (ortho, grid, snap, iso etc.),
Generation of points, lines, curves, polygons, dimensioning, layers, blocks, electrical symbols.
**Geometrical constructions**
**Curves Used In Engineering Practice**
   a) Conic Sections (General Method only- Eccentricity Method)
   b) Cycloid, Epicycloids and Hypocycloid

**UNIT-II:**
**2D PRJECTIONS**
**Orthographic Projections**: – Conventions – First and Third Angle projections.
Projections of Points, Projections of Lines, Projections of planes, Circuits Designs **–** Basic Circuit Symbols & Sensors

**UNIT– III**
**Projections of Solids**: Projections of regular solids prism and pyramid inclined to both planes.
**Sections of solids:** Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone, True shapes of the sections.

**UNIT– IV**
**3D Projections**
**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views, Commands for 3D UCS, Extrude, revolve, loft, 3D move, 3D rotate, dox, sphere, cone, wedge, cylinder, view ports.Plane
Figures, Simple and Compound Solids. 3D models of electrical components Switch, Diode, Resistor, Battery, Capacitor, Transistor, Motor

**UNIT– V**
**Transformation of Projections:** Visualize the 2D &3D View of Engineering Objects for Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects in AutoCAD

**TEXT BOOKS:**

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. "Computer Aided Engineering Drawing"by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers

**REFERENCE BOOKS:**

1. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

**COURSE OUTCOMES:**

After the completion of course the student will be capable to

1. Produce geometric construction, dimensioning & Curves and detail drawings.
2. Compile Projections of points, lines ,planes then create virtual drawing by using computer
3. Sketch the Solid Projections  & Sectioning of the solids
4. Develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. Understand and visualize the 3-D view of engineering objects. Elaborate the conversions of 2D -3D  and Vice-Versa

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### (R20A0501)PROGRAMMING FOR PROBLEM SOLVING

**Objectives**

- To understand the use of computer system in problem solving
- To understand the various steps in Program development.
- To learn the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To be able to write programs (using structured programming approach) in C to solve problems.

**UNIT - I**
**Introduction to Computing** – Computer Systems, Computing Environments, Computer Languages, Algorithms and Flowcharts, Steps for Creating and Running programs.
**Introduction to C** – History of C, Features of C, Structure of C Program, Character Set,
C Tokens - keywords, Identifiers, Constants, Data types, Variables. Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, typedef, enum
**Control Structures:** Selection Statements(Decision Making) – if and switch statements, Repetition Statements (Loops) - while, for, do-while statements, Unconditional Statements – break, continue, goto. Command line arguments.
**UNIT-II**
Pointers – Pointer variable, pointer declaration, Initialization of pointer, Accessing variables through pointers, Pointer Arithmetic, pointers to pointers, void pointers
**Arrays** – Definition, declaration of array, Initialization, storing values in array, Two dimensional arrays, Multi-dimensional arrays. Arrays and Pointers, Array of pointers
**Strings** – Declaration and Initialization, String Input / Output functions, Arrays of strings, String manipulation functions, Unformatted I/O functions, strings and pointers
**UNIT-III**
**Designing Structured Programs using Functions** - Types of Functions- user defined functions, Standard Functions, Categories of functions, Parameter Passing techniques, Scope – Local Vs Global, Storage classes, Recursive functions.
Passing arrays as parameters to functions, Pointers to functions, Dynamic Memory allocation
**UNIT-I**V
**Structures and Unions -** Declaration, initialization, accessing structures, operations on structures, structures containing arrays, structures containing pointers, nested structures, self referential structures, arrays of structures, structures and functions, structures and pointers, unions..
**Files** – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions. Sequential Access and Random Access Functions
**UNIT-**V
Basic Data Structures – Linear and Non Linear Structures – Implementation of Stacks, Queues, Linked Lists and their applications.

**Case Studies Case 1: Student Record Management System**

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

- ❖ Add record
- ❖ List record
- ❖ Modify record
- ❖ Delete record

**Case 2: Library Management System**

This project has 2 modules.

1. Section for a librarian
2. Section for a student

**A librarian** can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

**A student** can search for the book and check the status of the book if it is available. Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each Student. When a student borrows a book from the library, you link his ID to Book ID so that Librarian can find how burrowed particular book.
2. You can create a feature to bulk import the books from CSV file.
3. You can add REGEX to search so that a book can be searched using ID, title, author or any of the field.
4. You can add the student login section.

**TEXT BOOKS:**

1. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, Career Monk publications, 2017

**REFERENCE BOOKS:**

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Data Structures using C by Aaron M. Tenenbaum, Pearson Publications
6. Data Structures using C by Puntambekar

**Course Outcomes:**

- Understand a problem and build an algorithm/flowchart to solve it
- Interpret the structure of C program and various key features of C
- Construct C programs using various control statements, arrays and pointers
- Understand the concept of subprograms and recursion
- Develop programs using structures and unions for storing dissimilar data items
- Make use of files and file operations to store and retrieve data.

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### (R20A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of the English language and familiarizes the students with its use in everyday situations and contexts.

**COURSE OBJECTIVES:**

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

English Language Communication Skills Lab has two parts:

A. Computer Assisted Language Learning (CALL) Lab
B. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

**UNIT –I**

**CALL Lab:** Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions

**ICS Lab:** Ice-Breaking activity - JAM session

**UNIT –II**

**CALL Lab:** Pronunciation: Past Tense Markers and Plural Markers

**ICS Lab:** Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

**UNIT–III**

**CALL Lab:** Syllable and Syllabification

**ICS Lab:** Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

**UNIT –IV**

**CALL Lab:** Word Stress and Intonation

**ICS Lab:**Information transfer – from visual to verbal - maps, charts, tables and graphs

**UNIT –V**

**CALL Lab:** Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)

**ICS Lab:** Making a Short Speech - Extempore

**ELCS Lab:**
1.      **Computer Assisted Language Learning (CALL) Lab:**
The Computer aided Language Labfor 60 students with 60 systems, one master console, LAN facilityand English language software for self-study by learners.
**System Requirement (Hardware component):**
Computer network with LAN with minimum 60 multimedia systems with the following specifications:
i)        P     –IV      Processor
a)Speed –2.8 GHZ
b)       RAM –512 MB Minimum
c)       HardDisk –80 GB
ii)       Headphones of High quality
2.      **Interactive Communication Skills (ICS) Lab :**
A Spacious room with movable chairs and   audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

**COURSE OUTCOMES:**

After completion of the course the students will be able to:

1. Learn with precision through computer-assisted individualized and independent language learning to work independently in an engineering set-up.
2. Improve conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Acquire accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibe appropriate use of language in situations where one works as an individual and as a leader/team player.
5. Display professional behaviors and body language.

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## (R20A0281) BASIC ELECTRICAL ENGINEERING LAB

**COURSE OBJECTIVES:**
1. To design electrical systems.
2. To analyze a given network by applying various network theorems.
3. To expose the students to the operation of dc generator.
4. To expose the students to the operation of dc motor and transformer.
5. To examine the self excitation in dc generators.

**CYCLE – I**
1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Super position theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.

**CYCLE -II**
6. Magnetization characteristics of DC shunt generator.
7. Swinburne's test on DC shunt machine.
8. Brake test on DC shunt motor.
9. OC &SC tests on single phase transformer.
10. Load test on single phase transformer.

**NOTE:** Any 10 of above experiments are to be Conducted

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

1. Calculate the branch currents and mesh voltages by conducting KCL and KVL test on given

   circuit.

2. Prove the various circuit theorems like Superposition, Thevenin's, Norton's, Maximum power

   transfer and Reciprocity theorems.

3. Plot the Magnetization characteristics of DC shunt generator.

4. Plot the characteristics of DC shunt motor by conducting Brake Test.

5. Determine the Efficiency of single-phase transformer by conducting OC, SC and Load tests

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-/-/3/1.5

| (R20A581) PROGRAMMING FOR PROBLEM SOLVING LAB |

**Program Objectives:**

1. To understand the various steps in Program development.

2. To understand the basic concepts in C Programming Language.

3. To learn how to write modular and readable C Programs.

4. To learn to write programs (using structured programming approach) in C to solve problems.

5. To introduce the students to basic data structures such as lists, stacks and queues.

**Week 1:**

a) Write a program to find sum and average of three numbers

b) Write a program to calculate simple interest(SI) for a given principal (P), time (T), and rate of interest (R)   (SI = P*T*R/100)

**Week 2:**

a) Write a program to swap two variables values with and without using third variable

b) Write a program to find the roots of a quadratic equation.

**Week 3:**

a) Write a program to find the sum of individual digits of a given positive integer.

b) Write a 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)

**Week 4:**

a) Write a program to find both the largest and smallest number in a list of integers.

b) Write a program to find the sum of integer array elements using pointers

**Week 5:**

a) Write a program to perform addition of two matrices.

b) Write a program to perform multiplication of two matrices.

**Week 6:**

a) Write a program to find the length of the string using Pointer.

b) Write a program to count the number of lines, words and    characters in a given text.
**Week 7:**

a) Write a program to find factorial of a given integer using non-recursive function and recursive function.

b) Write program to find GCD of two integers using non-recursive function and recursive function.

**Week 8:**

a) Write a program using user defined functions to determine whether the given string is palindrome or not.

b) Write a Program to swap the values of two variables using

i) Call by Value ii) Call by Reference

**Week 9:**

a) Write a program to find the sum of integer array elements using pointers ,use dynamic memory allocation to allocate memory.

b) Write a program to perform subtraction of two matrices, Design functions to perform read ,display and subtract

**Week 10:**

a)  Write a program to create a structure named book and display the contents of a book.

b)  Write a Program to Calculate Total and Percentage marks of a student using structure.

**Week 11:**

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

   i) Reading a complex number             ii) Writing a complex number

   iii) Addition of two complex numbers      iv) Multiplication of two complex numbers

b)Write a program to reverse the first n characters in a file.

 (Note: The file name and n are specified on the command line.)

**Week 12:**

a) Write a program to copy the contents of one file to another.

b)  Write a program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third.

**Week 13:**

a) Write a program for static implementation of stack

b) Write a program for static implementation of Queue

**Week 14:**

  Write a program to perform various operations on single list

**Week 15:**

a) Write a program for dynamic implementation of stack

b) Write a program for Dynamic implementation of Queue

**Case Studies**

**Case 1: Student Record Management System**

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so

thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

- ❖ Add record
- ❖ List record
- ❖ Modify record
- ❖ Delete record

## Case 2: Library Management System

This project has 2 modules.

1. Section for a librarian
2. Section for a student

**A librarian** can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

**A student** can search for the book and check the status of the book if it is available.Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each student. When a student borrows a book from

the library, you link his ID to Book ID so that librarian can find how a particular book is borrowed.

2.You can create a feature to bulk import the books from CSV file.

3.You can add REGEX to search so that a book can be searched using ID, title, author or any of the field.

4.You can add the student login section.

## TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

## Program Outcomes:

1. Ability to apply solving and logical skills to programming in C language.
2. Able to apply various conditional expressions and looping statements to solve problems associated with conditions.

3. Acquire knowledge about role of Functions involving the idea of modularity.

4. Understand and apply the Concept of Array, Strings and pointers dealing with memory management.

5. Acquire knowledge about basic data structures and their implementation.

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## (R20A003) HUMAN VALUES AND PROFESSIONAL ETHICS

**COURSE OBJECTIVES:**
This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way.

3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

**UNIT - I:**
**Course Introduction -** Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

**UNIT - II:**
Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' ( I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

**UNIT - III:**
Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect ( Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society ( Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

**UNIT - IV:**
Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Inter connectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-

existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

**UNIT - V:**

**Implications of the above Holistic Understanding of Harmony on Professional Ethics:** Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

**TEXT BOOKS:**
1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

**REFERENCE BOOKS:**
1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics ( including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

**Relevant CDs, Movies, Documentaries & Other Literature:**
1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

**COURSE OUTCOMES**:
1. The students will be able to obtain happiness and prosperity in their life.
2. They will develop harmony at all levels.
3. They can have satisfying human behavior throughout their life.

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### (R20A0002) PROFESSIONAL ENGLISH

**INTRODUCTION:**

English is a tool for global communication and is the dominant language, which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

**COURSE OBJECTIVES:**

1. To enrich students to express themselves appropriately and fluently in professional contexts.
2. To enhance their employability through regular participation in group discussions and interview skills.
3. To lay foundation with writing strategies for the future workplace needs.
4. To acquaint students with different components of professional presentation skills.
5. To equip students with necessary training in listening to comprehend dialects of English language.

**UNIT-I**
Listening        - Listening for General Details.
Speaking        - Description of Pictures, Places, Objects and Persons
**NOTE:**Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract          - The summary of Asimov's *Nightfall*
Grammar         - If clauses Vocabulary   - Technical VocabularyWriting        - Paragraph Writing
**Unit –II**
Listening        -Listening for Specific Details
Speaking         - Oral presentations
**NOTE:**Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract          - A literary analysis of Asimov's *Nightfall*Grammar        - Transformation of Sentences
Vocabulary       - Idioms
Writing          -Abstract Writing
**Unit –III**
Listening        - Listening for GistSpeaking        - Mock Interviews
NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract          - Character sketches of Asimov's *Nightfall's* - protagonists and antagonists - Dr. Susan Calvin, Mike Donovan, Stephen Byerley, Francis Quinn
Grammar         - Transitive and Intransitive Verbs Vocabulary   - Standard Abbreviations (Mini Project)
Writing          - Job Application – Cover letter
**Unit – IV**
Listening        - Listening for Vocabulary

Speaking       - Telephonic Expressions

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Extract        - Theme of Asimov's *Nightfall*

Grammar        - Auxiliary verbs, Degrees of Comparison

Vocabulary     - Word Analogy

Writing        - Job Application - Resume

**Unit – V**

Listening      - Critical Listening (for attitude and Opinion)

Speaking       - Group discussion

NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.

Extract        -Asimov's *Nightfall*: A Science Fiction

Grammar        - Common Errors, Prepositions

Vocabulary     - Homonyms, homophones and homographs

Writing        - Report Writing

* Isaac Asimov's *Nightfall* for intensive and extensive reading
* Exercises apart from the text book shall also be referred for classroom tasks.

**REFERENCE BOOKS:**

1. Nightfall, Isaac Asimov; Robert Silverberg, 1990
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**COURSE OUTCOMES:**

Students will be able to:

1. Analyze and interpret a diverse range of engineering concepts through the synthesis ofinformation
2. Understand the impact of professional engineering solutions is societal contexts anddemonstrate its knowledge
3. Achieve communicative ability in their personal and professional relations with clarity of speech and creativity in content
4. Function effectively as an individual and a team; and would be able to prepare themselves to be market ready
5. Comprehend and write effective reports and design documentation, manage projects and make effective presentations.

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### (R20A0022) MATHEMATICS-II

**COURSE OBJECTIVES:**

1. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data,also used to find the roots of an equation and to solve differential equations.
2. The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
3. PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
4. Evaluation of multiple integrals.
5. In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

### UNIT – I: Solutions of algebraic, transcendental equations and Interpolation
**Solution of algebraic and transcendental equations:** Introduction, Bisection Method, Method of false position, Newton-Raphson method and their graphical interpretations.
**Interpolation:** Introduction, errors in polynomial interpolation, Finite differences - Forward differences, Backward differences, Central differences. Newton's formulae for interpolation, Gauss's central difference formulae, Interpolation with unevenly spaced points - Lagrange's Interpolation.

### UNIT – II: Numerical Methods
**Numerical integration :** Generalized quadrature - Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rules.
**Numerical solution of ordinary differential equations:** Solution by Taylor's series method, Euler's method, Euler's modified method, Runge-Kutta fourth order method.
**Curve fitting :** Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

### UNIT III: Partial Differential Equations
Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional equation (Heat equation).

### Unit IV: Double and Triple Integrals
Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar).

**Unit V: Vector Calculus**

Introduction, Scalar point function and vector point function, Directional derivative, Gradient, Divergence, Curl and their related properties, Laplacian operator, Line integral - work done, Surface integrals, Volume integral. Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

**TEXT BOOKS:**

1. Higher Engineering Mathematics by  B V Ramana ., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Mathematical Methods by S.R.K Iyenger, R.K.Jain, Narosa Publishers.

**REFERENCE BOOKS:**

1. Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
2. Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
3. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

**COURSE OUTCOMES:**

 After learning the concepts of this paper the student will be able to independently

1. Find the roots of algebraic, non algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Solve first order linear and non-linear partial differential equations which are very important in engineering field.
4. Evaluate multiple integrals; hence this concept can be used to evaluate Volumes and Areas of an object.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

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### (R20A0011) APPLIED PHYSICS

**COURSE OBJECTIVES:**

1. To analyze the ordinary light with a laser light and realize the transfer of light through optical fibers.
2. To identify dual nature of the matter and behavior of a particle quantum mechanically.
3. To explore band structure of the solids and classification of materials.
4. To acquire the basic knowledge of various types of semiconductor devices and find the applications in science and technology.
5. To Compare dielectric and magnetic properties of the materials and enable them to design and apply in different fields.

**UNIT – I**
**LASERS & FIBER OPTICS**
**Lasers:** Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon Laser, Semiconductor diode Laser, Applications of lasers.
**Fiber Optics:** Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and Propagation through step and graded index fibers ,Losses in optical fiber, Optical Fiber in Communication System, Applications of optical fibers.

**UNIT – II**
**QUANTUM MECHANICS**
Wave nature of particles, de Broglie's hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer's experiment, G.P Thomson experiment, Schrodinger time-independent wave equation-significance of wave function, particle in one dimensional square well potential.

**UNIT – III**
**ELECTRONIC MATERIALS**
Free electron theory(Classical & Quantum)- Assumptions, Merits and drawbacks, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny model (qualitative) , E – K diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semiconductors and insulators.

**UNIT-IV**
**SEMICONDUCTOR PHYSICS**
Intrinsic and extrinsic semiconductors, Direct and indirect band gap semiconductors, Carrier concentration in intrinsic and extrinsic semiconductors. Dependence of Fermi level on carrier concentration and temperature, carrier transport: mechanism of diffusion and drift, Formation of PN junction, V-I characteristics of PN diode, energy diagram of PN diode, Hall experiment, semiconductor materials for optoelectronic devices - LED, Solar cell.

**UNIT – V:**

**DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS**

**Dielectrics**: Introduction, Types of polarizations (Electronic and Ionic) and calculation of their polarizabilities, internal fields in a solid, Clausius-Mossotti relation.

**Magnetism:** Introduction, origin of magnetism, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Properties of anti-ferro and ferri magnetic materials, Hysteresis curve based on domain theory, Soft and hard magnetic materials.

**TEXT BOOKS:**
1. Engineering Physics by Kshirsagar & Avadhanulu, S Chand publications.
2. Engineering Physics- B.K.Pandey, S.Chaturvedi, Cengage Learning.

**REFERENCES:**
1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
3. Engineering physics 2$^{nd}$ edition –H.K. Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

**COURSE OUTCOMES:**

After completion of studying Applied Physics the student is able to

1. Observe the properties of light and its engineering applications of laser in fiber opticcommunication systems.
2. Apply the basic principles of quantum mechanics and the importance of behavior of a particle.
3. Find the importance of band structure of solids and their applications in various electronicdevices.
4. Evaluate concentration & estimation of charge carriers in semiconductors and workingprinciples of PN diode.
5. Examine dielectric, magnetic properties of the materials and apply them in material technology.

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### (R20A0401) ANALOG & DIGITAL ELECTRONICS

**COURSE OBJECTIVES:**

The main objectives of the course are:

1. To familiarize with the principal of operation, analysis and design of pn junction diode.
2. To study the construction of BJT and its characteristics in different configurations.
3. To study the construction and characteristics of JFET and MOSFET.
4. To study basic number systems codes and logical gates.
5. To introduce the methods for simplifying Boolean expressions and design of combinational circuits.

**UNIT-I**

**P-N Junction diode:** Qualitative Theory of P-N Junction, P-N Junction as a diode, diode equation, volt-ampere characteristics temperature dependence of V-I characteristic, ideal versus practical, diode equivalent circuits, Zener diode characteristics.

**UNIT-II**

**Bipolar Junction Transistor:** The Junction transistor, Transistor construction, Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. $\alpha$ and $\beta$ Parameters and the relation between them, BJT Specifications.

**UNIT-III**

**FIELD EFFECT TRANSISTOR:** JFET-Construction, principle of Operation, Volt–Ampere characteristics, Pinch- off voltage. Small signalmodelofJFET. FET as Voltage Variable Resistor, Comparison of BJT andFET. MOSFET- Construction, Principle of Operation and symbol, MOSFET characteristics in Enhancement and Depletionmodes.

**UNIT IV:**

**Number System and Boolean Algebra:** Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal, Unit Distance Code, Digital Logic Gates (AND, NAND, OR, NOR, EX-OR, EX-NOR), Properties of XOR Gates, Universal Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form.

**UNIT-V**

**Minimization Techniques:** The Karnaugh Map Method, Three, Four and Five Variable Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Multilevel NAND/NOR realizations.

**Combinational Circuits:** Design procedure – Half adder, Full Adder, Half subtractor, Full subtractor, Multiplexer/Demultiplexer, decoder, encoder, Code converters, Magnitude Comparator.

**TEXT BOOKS**

1. "Electronic Devices & Circuits", Special Edition – MRCET, McGraw Hill Publications,2017.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGrawHill.
3. Electronic Devices and Circuits, S.Salivahanan,N.Sureshkumar, McGrawHill.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003
5. Switching and Finite Automata Theory- ZviKohavi& Niraj K. Jha, 3rdEdition,Cambridge.

**REFERENCE BOOKS**

1. Electronic Devices and Circuits,K.Lal Kishore B.SPublications
2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
3. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI,2006
4. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning,2002.
5. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning,2003.

**COURSE OUTCOMES**

After completion of the course, the student will be able to:
1. Understand the principal of operation, analysis and design of pn junction diode.
2. Understand the construction of BJT and its characteristics in different configurations.
3. Understand the construction and characteristics of JFET and MOSFET.
4. Understand basic number systems codes and logical gates.
5. Understand the methods for simplifying Boolean expressions and design of combinational circuits.

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### (R20A0502) PYTHON PROGRAMMING

**COURSE OBJECTIVES:**

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, dictionaries.
5. To do input/output with files in Python.

**UNIT I**

**Introduction to Python Programming Language:** Introduction to Python Language and installation, overview on python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.

**UNIT II**

**Variables and Operators:** Understanding Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.

**UNIT III**

**CONTROL FLOW AND LOOPS**

Conditional (if), alternative (if-else), chained conditional (if- elif -else), Loops: For loop using ranges,string, Use of while loops in python, Loop manipulation using pass, continue and break

**UNIT IV**

**Functions**

Defining Your Own Functions, Calling Functions, passing parameters and arguments, Python Function 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. Powerful Lambda functions in python.

**UNIT V**

**I/O and Error Handling in Python**

Introduction, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.

**Introduction to Data Structures**: What are Data structures, Types of Data structures, Introduction to Stacks and Queues.

**TEXT BOOKS**

1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

**REFERENCE BOOKS:**

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

**COURSE OUTCOMES:**

Upon completion of the course, students will be able to

1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, and dictionaries.
5. Read and write data from/to files in Python Programs

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**-/-/3/1.5**

### (R20A0082) APPLIED PHYSICS LAB

**COURSE OBJECTIVES:**

Students can be able to

1   Identify the specific types of elastic and electrical nature of materials in physics lab.
2   Observe concepts of magnetism in physics lab.
3   Analyze propagation of light in various optical devices practically.
4   Examine various opto electronic devices practically
5   Well-equipped with the properties of semiconductor devices in physics lab.

**LIST OF EXPERIMENTS:**

1.  Torsional pendulum-Rigidity modulus of given wire.
2.  Melde's experiment –Transverse and Longitudinal modes.
3.  Stewart and Gee's method- Magnetic field along the axis of current carrying coil.
4.  Spectrometer-Dispersive power of the material of a prism
5.  Diffraction grating-using laser -Wavelength of light.
6.  Newton's Rings –Radius of curvature of Plano convex lens.
7.  LED -Characteristics of LED.
8.  Solar cell -Characteristics of a Solar cell.
9.  Optical fiber- Evaluation of numerical aperture of optical fiber.
10. Hall Effect –To study Hall effect in semiconducting samples.

**REFERENCE BOOKS:**

1.  Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S.Publications.
2.  Engineering physics practical lab manual – MRCET.

**COURSE OUTCOMES:**

1   Students are able to measure the elastic constants of the given material of the wire and determine the ac frequency f vibrating bar.
2   Students are able to determine the magnetic induction of a circular coil carrying current by applying the principles of terrestrial magnetism.
3   Students are able to frame relativistic ideas of light phenomenon
4   Students are able to achieve the analysis of V-I characteristics of opto electronic devices
5   Students are able to determine the carrier concentration and identify the given semiconductor material with the help of Hall Effect.

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### (R20A0582) PYTHON PROGRAMMING LAB

**COURSE OBJECTIVES:**
1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handling in Python

**Week 1:**
A)      Write python program to print Hello World
B)      Write a python program to get string, int, float input from user
C)      Write a python program to add 2 numbers

**Week 2:**
A) Create a list and perform the following methods
1) insert()    2) remove()    3) append()    4) len()    5) pop()    6) clear()
B) Write a python program to find the length of list?
C) Write a python program to find the smallest and largest number in the list?

**Week 3:**
A) Create a tuple and perform the following methods
1) Add items    2) len()    3) check for item in tuple    4)Access iems
B) Write a python program using the following methods: 1) count 2) index
C) Write a python program using "+" and "*" operations which resulting a new tuple?

**Week 4:**
A) Create a dictionary and apply the following methods
1) Print the dictionary items    2) access items  3) use get()  4)change values  5) use len()
B) Write a python code to convert list of tuples into dictionaries?
C) Write python program to store data in list, tuple, set, dictionary and then try to print them.

**Week 5:**
A)  Write a python program to perform arithmetic, assignment, logical and comparison operators?

B)  Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)

C)  Write a Python program to perform the basic four operators (+, -, *, /)

**Week 6:**
A)  Write a simple python program to declare a variable in different possible ways?

B)  Write a python program to show precedence of operators using the expression: z = (v+w) * x / y

C)  Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

**Week 7:**

A) Write a python program to print a number is positive/negative using if-else.

B) Write a python program to find largest number among three numbers.

C) Write a python Program to read a number and display corresponding day using if_elif_else?

D)     Write a python program to print list of numbers using range and for loop

**Week 8:**

A)     Write a python code to print the sum of natural numbers using while loop?

B)     Write a python program to print the factorial of given number?

C)     Write a python program to find the sum of all numbers stored in a list using for loop?

**Week 9:**

A)     Write a Python function that takes two lists and returns True if they are equal otherwise false

B)     Write python program in which an function is defined and calling that function prints Hello World

C)     Write python program in which an function(with single string parameter ) is defined and calling that function prints the string parameters given to function.

D)     Write a python program using with any one of python function argument?

**Week 10:**

A) Write a program to double a given number and add two numbers using lambda()?

B) Write a program for filter() to filter only even numbers from a given list.

C) Write a program for map() function to double all the items in the list?

D)Write a program to find sum of the numbers for the elements of the list by using reduce()?

**Week 11:**

A)  Write a python program to open and write "hello world" into a file?

   B) Write a python program to write the content "hi python programming" for the existing file.

C) Write a python program to read the content of a file?

**Week 12:**

A)  write a program to implement stack using array.

B)  write a program to implement Queue using array.

**TEXT BOOKS:**

**1.** R. Nageswara Rao, "Core Python Programming", dream tech

**2.** Allen B. Downey , " Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.

**COURSE OUTCOMES:**

After completion of the course, Students will be able to**:**

1.  Evaluate Problem solving and programming capability

2.  Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python

3.  Implement conditional and loop for python programs

4.  Express different Decision Making statements and Functions

5.  Understand and summarize different File handling operations and exceptions

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| (R20A0083) ENGINEERING AND IT WORKSHOP LAB |
|---|

It is consisting of 3 parts:

Part I: IT Workshop;

Part-II: Enectrical & Electronics Workshop;

Part III: Auto CAD Workshop

## Part I: IT Workshop:

**Objectives:**

- Understand the internal structure and layout of the computer system.
- Learn to diagnose minor problems with the computer functioning.
- Know the proper usage and threats of the world wide web.
- Study in detail about the various features of Ms-Word, Excel, PowerPoint.
- Gain an awareness about the tools of LibreOffice.

### Task- 1: PC HARDWARE

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripherals. Functions of Motherboard. Assembling and Disassembling of PC. Installing of OS.

### Task- 2: TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

### Task 3: INTERNET

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

### MS OFFICE

### Task 4: MICROSOFT WORD
Introduction to Word Processor, Editing and Formatting features, overview of toolbars,saving files, Using help and resources, rulers, fonts, styles, format painter, Drop Cap in word, Applying Text

effects, Using Character Spacing, Borders and colors, Inserting Header and Footer, Using Date and Time option in Word &Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and MailMerge in word.Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

### Task 5: MICROSOFT EXCEL

Excel Orientation: The importance of Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Excel formulae &Functions : formulae, logical functions, text functions, statistical functions, mathematical functions, lookup functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions.
Creating a Scheduler ( Features:- Gridlines, Format Cells, Summation, auto fill, Formatting)
Calculating GPA (Features:- Cell Referencing, Formulae and functions in excel )

### Task 6: MICROSOFT POWER POINT

Basic power point utilities and tools, PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Drawing toolbar-Lines and Arrows, Text boxes, Clipart, Insertion of images, slide transition, Custom animation, Hyperlinks.

### Task 7: LIBRE OFFICE

Overview of LibreOffice and its features of Writer, Calc, Impress, Draw, Base, Math, Charts.
**Libre office Math:** Introduction , Creating & Editing Formulas, formulas as separated documents or files, formulas in office document, Creating formulas, Formula layout
**Libre Office Draw :** Introduction, Basic shapes, working with objects, flowcharts, organization charts,

### Text Books:

1.Introduction to Information Technology,ITL Education Solutions limited, Pearson Education
2.PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)
3. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition
4. Libre Office Documentation : https://documentation.libreoffice.org/en/english-documentation

### Outcomes:

* Ability to identify the major components of a computer and its peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
* Students can detect and perform minor hardware and software level troubleshooting.
*     Capacity to work on Internet & World Wide Web and make effective usage of the internet foracademics.

## PART II:ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

**Course Objectives:**

1. To get acquaintance with Residential house wiring procedure.

2. To obtain the knowledge about fluorescent lamp wiring procedure.

3. To get familiarized with staircase wiring.

4. To perform soldering and desoldering practice.

**List of Experiments:**

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

2. Fluorescent lampwiring

3. Stair casewiring

4. Soldering and Desoldering practice – components, devices and circuits using general purpose PCB.

**Course Outcomes:**

1. Students will able to understand domestic wiring procedurespractically.

2. Students will able to doFluorescent lamp wiring.

3. Students will able to do staircasewiring.

4. Student will able to soldering and disordering practice.

## PART III: AUTOCAD WORKSHOP

**1. Introduction to AutoCAD**

Design Process, AutoCAD Installation Process, AutoCAD user Interface,Function Keys

**2. Commands:** Drawing Commands,Editing Commands, Drawings aids

**3. D Wireframe Modeling**

**4. CAD Practice Exercises**

**5. CAD -2D, CAD - Isometric**

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### (R20A0014) ENVIRONMENTAL SCIENCE

**COURSE OBJECTIVES:**

 On successful completion of this course, students will be able to:

1. Distinguish the inter relationship between living organism and environment.
2. Categorize various types of natural resources available on the earth surface.
3. Detectthe causes, and control measures of various types of environmental pollution.
4. Articulate the issues related to solid waste and its management.
5. Explain and understand the importance of sustainable development.

**UNIT-I:  ECOSYSTEMS:**
Definition, Scope, and Importance of ecosystem. Classification, natural and artificial ecosystems, structure - abDSic and bDSic component, functions of an ecosystem, food chains, food webs and ecological pyramids.
**Activities**: Case studies, poster making.

**UNIT-II:  NATURAL RESOURCES:**
Classification of Resources: Definition of natural resource, renewable and non -renewable resources. Renewable resources: Energy resources: growing energy needs solar energy, hydro energy, biogas, biofuel. Non-Renewable Resources: Fossil fuels, refining of Coal, Petroleum, and natural gas. Use of alternate energy source.
**Activities**: Case studies, seminars.

**UNIT-III:  ENVIRONMENTAL POLLUTION AND TECHNIQUES:**
Definition, Types of pollution:Air pollution causes, effects,control measures of air pollution and prevention techniques.Water pollution causes, effects, control measures and techniques.
**Activities:**Debate, seminars

**UNIT-IV:  SOLID WASTE MANAGEMENT:**
Definition of Solid waste, characteristics of solid waste, solid waste management: collection, transportation, processing treatment, disposal methods and e-waste management,3R techniques: reduce, reuse, and recycle.
**Activities**: Seminars, Case studies.

**UNIT-V:  SUSTAINABLE DEVELOPMENT:**
Definition of sustainable development, concept,sustainable development goals, threats to sustainability, strategies to achieve sustainable development.Introduction to green  chemistry, green building concept.
**Activities:** Worksheets, seminars.

**TEXT BOOKS:**
1.  Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission
2.  Environmental Studies by R. Rajagopalan, Oxford University Press.
3.  Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4.  Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

**REFERENCE BOOKS**
1.  Environmental Studies by Anubha Kaushik, 4 Edition, New age international publishers
2.  Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3.  Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4.  Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

**COURSE OUTCOMES:**
     The basic concepts included in this course will help the student to:
1.  Differentiate between various bDSic and abDSic components of ecosystem.
2.  Describe the various types of natural resources.
3.  Examine the problems associated with waste management.
4.  Evaluate the causes, and apply control measures of various types of environmental pollutions.
5.  Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

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### (R20A0503) DATA STRUCTURES USING PYTHON

**COURSE OBJECTIVES:**

This course will enable students to

1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Understanding how searching and sorting in Python.
4. Understanding how liner and non-liner data structures works.
5. To learn the fundamentals of writing Python scripts.

**UNIT –I**

Oops Concepts-Class, object, types of variables, types of methods, inheritance, Encapsulation, Polymorphism, Abstraction, special functions, constructors.

**UNIT -II**

Data Structures, Types-User define, predefine, List, List comprehension, Arrays vs. List, Tuples, Set, Dictionaries, Expressions, Slicing, strings, String processing, Python memory model: names, mutable and immutable values.

**UNIT -III**

**Searching-**Linear Search and Binary search. **Sorting-** Bubble Sort, Selection Sort, Insertion Sort, Merge sort, Quick sort.

**UNIT -IV**

Stacks and Queues implementation, Linked List, Double Linked List, Circular Linked list, Heap

**UNIT -V**

**Graphs-**Breadth First Search, Depth First Search. **Trees** - Binary search trees: find, insert, delete | Height-balanced binary search trees.

**TEXTBOOKS:**

1. Data structures and algorithms in python by Michael t. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

**REFERENCE BOOKS:**

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

**COURSE OUTCOMES:**

The students should be able to:

1.  Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2.  Create, run and manipulate Python Programs using core data structures like Lists,
3.  Dictionaries and use Regular Expressions.
4.  Interpret the concepts of Object-Oriented Programming as used in Python.
5.  Master object-oriented programming to create an     entire python project using objects and classes.

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| (R20A0504) OPERATING SYSTEM |
|---|

**COURSE OBJECTIVES:**

1. To understand the basic concepts and functions of operating systems.
2. To understand Processes and Threads
3. To understand the concept of Deadlocks.
4. To analyze various memory management schemes.
5. To understand I/O management and File system

**UNIT-I**

**Introduction:** Concept of Operating System, OS Services, Structure of Operating Systems.

**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

**Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of Multithreading.

**UNIT-II**

**Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR **Inter-Process Communication:** Critical Section, Race Conditions, Mutual Exclusion. Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, The Producer/Consumer Problem, Semaphores, Monitors.

**UNIT-III**

**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation; **Paging**: Principle of operation – Page allocation – Hardware support for paging, protection and sharing.

**Virtual Memory**: Basics of Virtual Memory, Page fault , Demand paging; **Page Replacement algorithms:** Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

**UNIT-IV**

**File Management**: Concept of File, Access methods, Directory structure, File types, File operation, File System structure, Allocation methods (contiguous, linked, indexed), Free- Space Management, Directory implementation (linear list, hash table), efficiency and performance.

**UNIT-V**

**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

**TEXT BOOKS:**

1. OperatingSystemConceptsEssentials, 9thEdition by Avi Silberchatz,Peter Galvin,Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems:Internals and Design Principles, 5thEdition, William Stallings, Prentice Hall of India.

**REFERENCE  BOOKS:**

1. Operating System:A Design-oriented Approach,1$^{st}$ Edition by Charles Crowley, Irwin Publishing
2. Operating Systems:A Modern Perspective,2$^{nd}$ Edition by Gary J.Nutt,Addison- Wesley
3. Design of the UNIX Operating Systems, 8thEdition by Maurice Bach, Prentice- Hall of India.
4. Understanding the Linux Kernel, 3rd Edition,Daniel P.Bovet,Marco Cesati, O'Reilly and Associates.

**COURSE OUTCOMES:**

At the end of the course the students are able to:

1. Create processes and threads.
2. Implement algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
3. Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. Analyze various disk scheduling schemes

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## (R20A0505) DESIGN AND ANALYSIS OF ALGORITHMS

**COURSE OBJECTIVES:**
1.   To analyze performance of algorithms.
2.   To choose the appropriate data structure and algorithm design method for a specified application.
3.   To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
4.   To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
5.   To understand the differences between tractable and intractable problems and to introduce P and NP classes.

**UNIT I**
**Introduction:** Algorithms, Pseudo code for expressing algorithms, performance analysis- Space complexity, Time Complexity, Asymptotic notation- Big oh notation, omega notation, theta notation and little oh notation.
**Divide and Conquer:** General method. Applications- Binary search, Quick sort, merge sort, Strassen's matrix multiplication.

**UNIT II**
Disjoint set operations, Union and Find algorithms, Spanning trees, AND/OR graphs, connected components, Bi-connected components.

**UNIT III**
**Greedy method:** General method, applications- Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.
**Dynamic Programming:** General method, applications- Matrix chained multiplication, Optimal binary search trees, 0/1 Knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

**UNIT IV**
**Backtracking:** General method, Applications- n-queue problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

**UNIT V**
**Branch and Bound:** General method, applications- Travelling sales person problem, 0/1 Knapsack problem- LC branch and Bound solution, FIFO branch and Bound solution.
**NP-Hard and NP-Complete Problems**: Basic concepts, Non deterministic algorithms, NP-Hard and NP-Complete classes, NP-Hard problems, Cook's theorem.

**TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharan,

Universities press

2. Design and Analysis of Algorithms, P. h. Dave,2ndedition,Pearson Education.

**REFERENCES:**

1. Introduction to the Design and Analysis of Algorithms A Levitin Pearson Education

2. Algorithm Design foundations Analysis and Internet examples, M.T.Goodrich and RTomassia John

Wiley and sons

3. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ.Press

4. .Design and Analysis of Algorithms,Aho, Ulman and Hopcraft, Pearson Education.

5. Foundations of Algorithms, R. NeapolitanandK.Naimipour, 4th edition

**COURSE OUTCOMES:**

1.   Ability to analyze the performance of algorithms.

2.   Ability to choose appropriate algorithm design techniques for solving problems.

3.   Ability to understand how the choice of data structures and the algorithm design methods to impact the performance of programs.

4.   Describe the dynamic programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms and analyze them.

5.   Describes the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms and analyze them.

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## (R20A0411) COMPUTER ORGANIZATION AND ARCHITECTURE

**COURSE OBJECTIVES:**

1. To understand basic components of computers.
2. To understand the architecture of 8086processor. Instruction set, instruction formats and various addressing modes of8086.
3. To understand the representation of data at the machine level and how computations are performed at machine level.
4. To understand the memory organization and I/Organization.
5. To understand the parallelism both in terms of single and multiple processors.

### UNIT – I:

**Digital Computers:** Introduction, Block diagram of the Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

**Basic Computer Organization and Design:** Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

**Micro Programmed Control:** Control memory, Address sequencing, micro program example, design of control unit.

### UNIT – II:

Data Representation, **Computer Arithmetic-**Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating Point Arithmetic operations,Decimal Arithmetic unit, Decimal Arithmetic operations.

**Central Processing Unit: General** Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

### UNIT – III:

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

**Input-Output Organization:** Peripheral Devices**,** Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Intel 8089IOP.

### UNIT – IV:

**8086 Processor:** Architecture, Register organization, Physical memory organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum and Maximum mode operation.

8086 Instruction Set and Assembler Directives-Machine language instruction formats, addressing modes, Instruction set.

Assembly Language Programming with 8086- Machine level programs, Machine coding the programs, Programming with an assembler, Examples.

Stack structure of 8086, Interrupts and Interrupt service routines, Interrupt cycle, Interrupt programming, Passing parameters to procedures, Macros, Timings and Delays.

**UNIT – V:**

**Reduced Instruction Set Computer:** CISC Characteristics, RISC Characteristics. **Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

**Multi Processors:** Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

**TEXT BOOKS:**

1.  Computer System Architecture, M. Moris Mano, Third Edition, Pearson.(**UNITS-I, IV, V**)
2.  Advanced Microprocessors and Peripherals, K M Bhurchandi, A.K Ray, 3rdedition, McGraw HillIndia Education Private Ltd. **(UNITS - II, III).**
3.  David A. Patterson and John L. Hennessey, "Computer Organization and Design", Fifth edition,Morgan Kauffman / Elsevier, 2014.

**REFERENCES:**

1. Microprocessors and Interfacing, D V Hall, SSSP Rao, 3$^{rd}$ edition, McGraw Hill India EducationPrivateLtd.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky: Computer Organization, 5$^{th}$ Edition, Tata McGraw Hill,2002
3. Computer Organization and Architecture, William Stallings, 9th Edition, Pearson.
4. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4$^{th}$Edition, Elsevier, 2009

**COURSE OUTCOMES:**

1.  Explain thebasic components and the design of CPU, ALU and ControlUnit.
2.  Understand memory hierarchy and its impact on computer cost/Performance.
3.  Understand the instruction set, instruction formats and addressing modes of 8086.
4.  Write assembly language programs to solve problems.
5.  Understand the advantage of instruction level parallelism and pipelining for high performanceProcessor design.

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**(R20A0024)PROBABILITY AND STATISTICS**

**COURSE OBJECTIVES:**
1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
3. To build the linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

**UNIT – I: Random Variables**
Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.
Multiple Random variables:Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function and density functions.

**UNIT-II: Probability Distributions**
Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution,Normal distribution – mean, variance, median,mode and characteristics of Normal distribution.

**UNIT -III:Correlation and Regression**
Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.
Multiple correlation and regression: Coefficient of multiple Correlations and multiple regression,multiple linear regression equations.

**UNIT –IV: Sampling and Testing of Hypothesis for Large Samples**
Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, Standard error - Sampling distribution of means and variance. Estimation - Point estimation and Interval estimation.
Testing of hypothesis , Null and Alternative hypothesis, Type I and Type II errors, Critical region, confidence interval, Level of significance, one tailed and two tailed test.
Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

**Unit-V: Testing Arf Hypothesis for Small Samples**
Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test), Chi- square test for goodness of fit and independence of attributes.

**TEXT BOOKS:**

1. Fundamental of Statistics by S.C. Gupta, 7th Edition, 2016.

2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor

3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35th Edition, 2000.

**REFERENCES BOOKS:**

1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M.Ross.

2. Probability and Statistics for Engineers by Dr. J. Ravichandran

**COURSE OUTCOMES**:

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

1. Evaluate randomness in certain realistic situation which can be either discrete or continuoustype and compute statistical constants of these random variables.

2. Provide very good insight which is essential for industrial applications by learning probabilitydistributions.

3. Higher up thinking skills to make objective, data-driven decisions by using correlation andregression.

4. Assess the importance of sampling distribution of a given statistic of a random sample.

5. Analyze and interpret statistical inference using samples of a given size which is taken from apopulation.

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### (R20A0061)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**COURSE OBJECTIVES:**
**The main objectives of the course are:**
1. To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound  economic decision making.
2. To provide inputs on an overall analysis of an individual firm, its production function, cost analysis and break-even-point
3. To make students understand different market structures, pricing of the product or services and different forms of business organizations.
4. To understand capital requirements of the business and basic rule of accounting of the business.
5. To learn analytical techniques and arriving at conclusions from financial information for  the purpose of business decision making.

**Unit-I**
**Introduction to Managerial Economics:** Definition, Nature and Scope of Managerial Economics, Micro and Macroeconomic Concepts.
**Demand Analysis:** Demand Determinants, Law of Demand and exceptions.
**Elasticity ofDemand:**Definition, Types, Measurement and Significance of elasticity of Demand.
**Demand Forecasting:** Factors governing Demand Forecasting, Methods of Demand Forecasting (Survey Methods, Expert Opinion, Test Marketing, Controlled Experience, Judgmental Approach, and Time Series Analysis).

**Unit-II**
**Production & Cost Analysis:**Production Function- Isocost and Isoquants, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production Function, Laws of Returns, Internal and External Economies of Scale.
**Cost Analysis:** Cost Concepts. Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)

**Unit-III**
**Markets:** Types of Competition and Markets, Features of Perfect Competition, Monopoly and Monopolistic Competition;
**Pricing:** Objectives, Methods of Pricing;
**Business:** Features of different forms of Business Organization (Sole Trader, Partnership, Joint Stock Company, Cooperative Society, and Public Enterprises).

**Unit-IV**
**Introduction to Capital and Financial Accounting:** Need for Capital, Types of Capital, Working Capital Analysis, Methods and Sources of raising Finance.

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**Accounting:** Definition, Concepts and Conventions (GAAP); Accounting Cycle; Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

**Unit-V**
**Investment Decision:** Capital Budgeting - Features, Objectives, and Methods (Payback Method, Accounting Rate of Return and Net Present Value) - advantages & disadvantages. (Simple Problems)
**Financial Analysis:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital Structure Ratios and Profitability Ratios. (Simple Problems)

**References:**

1. Managerial Economics & Financial Analysis, Special Edition-MRCET. McGraw Hill Publications, 2017

2. D.N. Dwivedi, Managerial Economics, Vikas Publications.

3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage

4. P. L. Mehta, Managerial Economics: Analysis, Problems and Cases, Sultan Chand & Sons.

5. S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas Publications.

6. M. Y. Khan and P. K. Jain, Financial Management, McGraw Hill

**COURSE OUTCOMES:**

**Following are the course outcomes:**

1. Makes students understand the concepts and applications of managerial economics in taking business decisions.

2. Empowers students to comprehend with the production process and technical relationship among factors of production, different cost concepts and optimization of cost.

3. Enables students to know the classification of markets and how firms determine their price output decisions in different kinds of markets with different forms of business.

4. Allows students to know different sources of capital for the business and how financial accounting is done for smooth business functioning.

5. Equips students with different financial analysis tools and techniques to evaluate financial performance of the business.

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### (R20A0583) DATA STRUCTURES USING PYTHON LAB

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**COURSE OBJECTIVES:**
1. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
2. To understand the how linear and non-linear data structures works

**WEEK 1:** Write a Python program for class, Flower, that has three instance variables of type str, int, and float, that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.

**WEEK 2:** Write a Python program for class that extends the Progression class so that each value in the progression is the absolute value of the difference between the previous two values. You should include a constructor that accepts a pair of numbers as the first two values, using 2 and 200 as the defaults.

**WEEK 3:** Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area ( ) and perimeter (  ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area ( ) and perimeter ( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter.

**WEEK 4:** Write a Python program that inputs a list of words, separated by whitespace,and outputs how many times each word appears in the list.

**WEEK 5:** Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list.**Example:** Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5].....[7, 8] [7, 9] [8, 9].

**WEEK 6:** Write a Python program for Linear Search and Binary search

**WEEK 7:** Write a program to implement Bubble Sort and Selection Sort

**WEEK 8:** Write a program to implement Merge sort and Quicksort.

**WEEK 9:** Write a program to implement stacks and Queues

**WEEK 10:** Write a program to implement linked list

**WEEK 11:** Write a program to implement Double Linked list

**WEEK 12:** Write a program to implement Binary search Tree

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**Reference Books:**

1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.

2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.

3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.

4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

**COURSE OUTCOMES:**

1. Student should be able to understand concepts of data structures
2. Ability to explore python especially the object-oriented concepts, and the built-in objects of Python.

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| (R20A0584)  OPERATING SYSTEM LAB |
|---|

**COURSE OBJECTIVES:**
1.   To provide an understanding of the design aspects of operating system concepts through

      simulation DBM

2.    Introduce basic UNIX commands, system call interface for process management, interprocess

       communication and I/O in UNIX.

3.   Students will learn various process and CPU scheduling algorithms through simulation

      programs.

4.   Student will learn about communication using socket programming.

5.   Student will have exposure to system calls and simulate them.

**Week 1:**
Practice File handling utilities, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

**Week 2:**
a) Write a shell script that receives any number of file names as arguments checks if every argument

 supplied is a file or directory and reports accordingly. Whenever the argument is a file it reports no of

lines present init.

b) Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of

each word that is present in the first argument file on other argument files.

**Week 3:** Simulate the following CPU scheduling algorithms.
a) FCFS b) SJF c) Round Robin d) Priority.

**Week 4:** Write a C program to simulate producer-consumer problem using Semaphores

**Week 5:** Write a C program to simulate the concept of Dining-philosophers problem.

**Week 6:** Simulate all page replacement algorithms a) FIFO b) LRU c) OPTIMAL

**Week 7:** Simulate Bankers Algorithm for Dead Lock Avoidance.

**Week 8**: Simulate Bankers Algorithm for Dead Lock Prevention.

**Week 9:** Write a C program to simulate disk scheduling algorithms. a)FCFS b) SCAN c) C-SCAN

**Week 10:**
Write a C program that takes one or more file/directory names as command line input and reports following information
A) File Type
B) Number of Links
C)   Time of last Access
D)   Read, write and execute permissions

**Week 11:**
a) Implement in c language the following Unix commands using system calls
i) Catii) lsiii) Scanning Directories (Ex: opendir (), readdir (), etc.)
a) Write a C program to create child process and allow parent process to display "parent" and the child to
display "child" on the screen

**Week 12:**
a) Write a C program to implement kill (), raise () and sleep () functions.
b) Write a C program to implement alarm (), pause () and abort () functions
c) Write a program that illustrate communication between two process using unnamed pipes

**Week 13:**
a)   Writea program that illustrates communication between two processes using named pipes or FIFO.
b) Write a C program that illustrates two processes communicating using Shared memory.

**Week 14:**
a) Write a C program that receives a message from message queue and display them.
b) Write client server programs using c for interaction between server and client process using sockets

**COURSE OUTCOMES:**
Students will be able to:
1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using UNIX system calls.
3. Be able to simulate various system calls.
4. Be able to use various Linux utilities.
5. Be able to use various basic Linux commands.

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**(R20A0004) FOREIGN LANGUAGE-FRENCH**

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**INTRODUCTION**

In view of the growing importance of foreign languages as a communication tool in some countries of the world, French has been identified as one of the most popular languages after English. As a result, Frenchprogram is introduced to develop the linguistic and communicative skills of engineering students andto familiarize them to the French communication skills. This course focuses on basic oral skills.

**OBJECTIVES**

1. To inculcate the basic knowledge of the French language
2. To hone the basic sentence constructions in day to day expressions for communication in their vocation
3. To form simple sentences that aids in day-to-day communication
4. To prepare the students towards DELF A1
5. To develop in the student an interest towards learning languages.

**UNIT - I:**

Speaking:Introduction to the French language and culture –Salutations - French alphabet - Introducing people
Writing:Understand and fill out a form
Grammar:The verbs "to be ' and "to have '' in the present tense of the indicative
Vocabulary: The numbers from 1 to 20 - Professions- Nationalities

**UNIT - II:**

Speaking:Talk about one's family – description of a person - express his tastes and preferences - express possession - express negation
Writing:Write and understand a short message
Grammar:Nouns (gender and number) - Articles - The–erverbs in the present-Possessive adjectives - Qualifying adjectives
Vocabulary:The family – Clothes-Colors- The numbers from 1 to 100-The classroom

**UNIT - III**

Speaking:Talk about your daily activities - be in time - ask and indicate the date and time - talk about sports and recreation - express the frequency
Writing:A letter to a friend
Grammar:The expression of time– The –ir verbs in the present- The verbs do, go, take, come,- Adverbs-Reflexive verbs
Vocabulary: The days and months of the year-     The sports-Hobbies

**UNIT - IV**

Speaking: Express the quantity - ask and give the price - express the need, the will and the capacity - compare (adjective) - speak at the restaurant / in the shops
Writing: A dialogue between a vendor and a customer at the market
Grammar: Verbs "to want", "to can"- Express capacity / possibility- Express will / desire – the

future tense

Vocabulary:  The food – Meals-Fruits and vegetables– The parts of the body

**UNIT - V**

Speaking: Express the prohibition and the obligation - describe an apartment - talk about the weather / ask the weather - ask the opinion - give your opinion - express your agreement or disagreement

Writing:     Descriptions

Grammar: Demonstrative adjectives- Prepositions- The verb 'must' to indicate obligation and necessity in the present

Vocabulary:   Seasons – Holidays-The city– Furniture

NOTE: The students are exposed to simple listening and reading activities.

**REFERENCE BOOKS**

1. Apprenons le François 1& 2, New Sarasvati House, 2015
2. A propos, A1, Langers International, 2010
3. Easy French Step-by-step by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Course book) By Livid Language
5. Ã L'Aventure: An Introduction to French Language and Francophone Cultures by Eveline Charvier-Berman, Anne C. Cummings.

**COURSE OUTCOMES**

1. The students will be able to communicate in French at A1 level.
2. The student will have an advantage in the competitive job market.
3. This course benefits the graduates when pursuing study *opportunities* in the countries where French is the official language.

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## (R20A0026)DISCRETE MATHEMATICS

**COURSE OBJECTIVES:**

1. Describe mathematical concepts as applied in computer science for solving logicalproblems.
2. Understanding the concepts of sets, functions, relations,recurrence relations and Lattices.
3. Understand the concepts on elementary combinations and permutations.
4. To develop the mathematical skills needed for advanced quantitative courses.
5. Analyze the properties of graphs and trees.

**UNIT – I:**

**Mathematical Logic:** Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms.
**Predicates:**Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

**UNIT – II:**

**Posets and Lattices:**Relations and their properties,Properties of binary relations, equivalence, compatibility and partial ordering relations, lattices, Hasse diagram; Functions-Inverse function, composition of functions, recursive functions.
Lattices as partially ordered sets; Definition and examples, properties of lattices, sub lattices, some special lattices.

**UNIT - III:**

**Groups: Algebraic** structure, Groupoid, Monoid, Semi groups, Group, Sub groups, Homomorphism and Isomorphism of groups.
**Elementary Combinatorics** : Basics of counting, The permutations, disarrangements, combinations, permutations and combinations with repetitions, constrained repetitions, the principal of Inclusion-Exclusion, Pigeon hole principle.

**UNIT-IV:**

**Advanced Counting Techniques :** Generating Function of Sequences, Recurrence relations, Solving Recurrence Relations by substitution and Generating function ,The method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

**UNIT-V:**

**Graphs Theory:**Introduction to Graphs, Isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, Graph coloring, Directed graphs, weighted digraphs, chromatic numbers.Trees and their properties, Spanning trees, Directed trees, Binary trees Minimal Spanning Trees.

**TEXT BOOKS:**

1. C. L. Liu, D. P. Mohapatra, —Elements of Discrete Mathematics, Tata Mcgraw-Hill, India, 3rdEdition,2008.

2. J. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science , Tata McGraw Hill, India, 1stEdition,1997.

3. JoeL.Mott, Abraham Kandel, Theodore P.Baker,—Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India Learning Private Limited, New Delhi, India, 2nd Edition,2010.

**REFERENCE BOOKS:**

1.  Kenneth H. Rosen, —Discrete Mathematics and Its Applications, Tata Mcgraw-Hill, New Delhi, India,6thEdition,2012.
2.  Ralph P. Grimaldi, B. V. Ramana, —Discrete and Combinatorial Mathematics - An Applied Introduction, Pearson Education, India, 5thEdition, 2011.
3.  D. S. Malik, M. K. Sen, —Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, India, 1stEdition, 2004.

**COURSE OUTCOMES:**

After learning the concepts of this paper the student will be able to

Apply Propositional and Predicate logic for a variety of problems in various domains.

1. Understand Set Theory, Venn Diagrams, relations, functions and apply them to Real-world Scenarios.

2. Understand General properties of Algebraic systems and study lattices as partially ordered sets and their applications.

3. Solve the recurrence relations and can be used to optimize algorithms.

4. To identify the basic properties of graphs and trees and use these concepts to model simple applications.

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### (R20A0507) FORMAL LANGUAGES AND AUTOMATA THEORY

**COURSE OBJECTIVES:**
1.  Understand mathematical models (finite automata) for language processing.
2.  Explain Regular Expressions and Finite Automata Conversions.
3.  Understand Grammars for Regular and Context Free Languages.
4.  Learn Context Free Grammar Normal Forms and Push Down Automata.
5.  Explain Computational theory and different models.

**UNIT I**
**Fundamentals**: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings and languages, deterministic finite automaton and nondeterministic finite automaton, transition diagrams and language recognizers.

**Finite Automata**: NFA with ∈ transitions - significance, acceptance oflanguages. Conversions and Equivalence: Equivalence between NFA with and without ∈ transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealymachines.

**UNIT II**
**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.

**UNIT III**
**Grammar Formalism**: Introduction, **Regular grammars**-right linear and left linear grammars, equivalence between regular grammar and FA, inter conversion, **Context free grammars**-Derivation trees, sentential forms, Right most and leftmost derivation of strings.
**UNIT IV**
**Optimization and Normalization:** Ambiguity in context free grammars, optimization of context free grammars, Chomsky normal form, Greibach normal form, Pumping Lemma for Context Free Languages, Enumeration of properties of CFL.

**Push Down Automata**: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty stack and its equivalence, equivalence of CFL and PDA, inter conversion, Introduction to DCFL andDPDA. **Context sensitive grammars**, languages and Linear bounded Automata

**UNIT V**
**Turing Machine**: Unrestricted grammars, Turing Machine-definition, model, design of TM, computable functions, Turing recognizable (Recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, Church's hypothesis, counter machine, types of

Turing machines.

**Computability Theory**: Chomsky hierarchy of languages, LR(0) grammar, decidability of problems, Universal Turing Machine, un decidability of posts correspondence problem, Turing reducibility, definition of P and NP problems, NP complete and NP hardproblems.

**TEXT BOOKS**

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to AutomataTheory, Languages, and Computation, Pearson Education Asia.

**REFERENCE BOOKS:**

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory ofComputation, Pearson Education

Asia.

2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in ComputerScience, Springer.

3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.

4. John Martin, Introduction to Languages and The Theory of Computation, TataMcGraw Hill.

**COURSE OUTCOMES:**

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

1. Design Finite Automata models for language acceptance.

2. Construct Regular Expressions and equivalent automata models.

3. Formulate Grammars for different types of formal languages.

4. Represent Normal Forms and design Push Down Automata.

5. Experiment with and Analyze different Computational models.

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## (R20A0508)OBJECT ORIENTED PROGRAMMING THROUGH JAVA

## COURSE OBJECTIVES:
1. To understand object oriented principles like abstraction, encapsulation, inheritance, and polymorphism and apply them in solving problems.
2. To understand the implementation of packages and interfaces.
3. To understand the concepts of exception handling, multithreading and collection classes.
4. To understand how to connect to the database using JDBC.
5. To understand the design of Graphical User Interface using applets and swing controls.

# UNIT-I
**Java Programming-** History of Java, comments, Java Buzz words, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, arrays, simple java stand alone programs, class, object, and its methods constructors, methods, static fields and methods, access control, this reference, overloading constructors, recursion, exploring string class, garbage collection.

# UNIT – II
**Inheritance –** Inheritance types, super keyword, preventing inheritance: final classes and methods.

**Polymorphism –** method overloading and method overriding, abstract classes and methods**.**

**Interfaces-** Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface, inner class.

**Packages-** Defining, creating and accessing a package, importing packages.

# UNIT-III

**Exception handling-**Benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception subclasses.

**Multithreading –** Differences between multiple processes and multiple threads, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer problem.

# UNIT-IV

**Collection Framework in Java** – Introduction to java collections, Overview of java collection framework, commonly used collection classes- Array List, Vector, Hash table, Stack, Lambda Expressions.

**Files-** Streams- Byte streams, Character streams, Text input/output, Binary input/output, File management using File class.

**Connecting to Database –** JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC,Data Access Object (DAO).

# UNIT-V

**GUI Programming with Swing -** The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow

**Event Handling**- Events, Event sources, Event classes, Event Listeners, Delegation event model, Examples: HandlingMouse and Key events, Adapter classes.

## TEXT BOOK:

1. JavaFundamentals–AComprehensiveIntroduction,HerbertSchildtandDaleSkrien,TMH.
2. Core Java: An Integrated Approach – Dr R Nageswara Rao

## REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program ,P.J.Deitel and H.M.Deitel,PHI
2. Object Oriented Programming through Java, P.RadhaKrishna, and Universities Press.
3. Thinking in Java, Bruce Eckel,PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford UniversitiesPress.
5. Design Patterns Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides.

## COURSE OUTCOMES:

1. A competence to design, write, compile, test and execute straightforward programsusing a high level language;
2. An appreciation of the principles of object oriented programming;
3. Be able to make use of members of classes found in the Java API
4. Demonstrate the ability to employ various types of selection constructs in a Javaprogram. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
5. Able to develop applications using Applet, AWT, JDBC and Swing

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### (R20A0509)DATABASE MANAGEMENT SYSTEMS

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**COURSE OBJECTIVES:**

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models

2. To understand and use data manipulation language to query, update, and manage a database

3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

5. Familiar with basic database storage structures and access techniques: file and page organizations,

**UNIT I:**

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction – Instances and Schemas – Database Languages – database Access for applications Programs – Database Users and Administrator – Transaction Management – Database Architecture – Storage Manager – the Query Processor.

Data Models: Introduction to the Relational Model – Structure – Database Schema, Keys – Schema Diagrams. Database design– Other Models, ER diagrams – ER Model - Entities, Attributes and Entity sets – Relationships and Relationship sets – ER Design Issues – Concept Design – Conceptual Design with relevant Examples. Relational Query Languages, Relational Operations.

**UNIT II:**

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple Relational Calculus (TRC) – Domain relational calculus (DRC).

Overview of the SQL Query Language – Basic Structure of SQL Queries, Set Operations, Aggregate Functions – GROUPBY – HAVING, Nested Sub queries, Views, Triggers, Procedures.

**UNIT III:**

Normalization – Introduction, Non loss decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyce/Codd normal form.

Higher Normal Forms - Introduction, Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form .

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## UNIT IV:

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

## UNIT V:

Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Check Points - Buffer Management – Failure with loss of nonvolatile storage.

## TEXT BOOKS:

1. Database System Concepts, Silberchatz, Korth, McGraw hill, Sixth Edition.(All UNITS except III th)
2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TATA McGraw-Hill 3rd Edition.

## REFERENCE BOOKS:

1. Fundamentals of Database Systems, Elmasri Navathe Pearson Education.
2. An Introduction to Database systems, C.J. Date, A.Kannan, S.Swami Nadhan, Pearson, Eight Edition for UNIT III.

## COURSE OUTCOMES:

1  Demonstrate the basic elements of a relational database management system
2  Ability to identify the data models for relevant problems
3  Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data
4  Familiar with basic database storage structures and access techniques: file and page organizations,
5  Apply normalization for the development of application software's

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### (R20A0513) ARTIFICIAL INTELLIGENCE

**COURSE OBJECTIVES:**

1. To train the students to understand different types of AI agents.
2. To understand various AI search algorithms.
3. Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation.
4. Fundamentals of reasoning
5. Study of Markov Models enable the student ready to step into applied AI.

**UNIT- I:**
**Introduction:**AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

**UNIT- II:**
**Advanced Search**: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

**UNIT- III:**
**Advanced Knowledge Representation and Reasoning**: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes

**Reasoning Under Uncertainty**: Basic probability, actingunder Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

**UNIT - IV:**
**Learning:** What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

**UNIT - V:**
**Expert Systems**: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

**TEXT BOOKS:**

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.

**REFERENCES**:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009. 2. George F. Luger,

2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

**COURSE OUTCOMES:**

1. Understand the informed and uninformed problem types and apply search strategies to solve them.
2. Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
3. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.
4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.
5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information anddevelop models within constraints of application area

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**OPEN ELECTIVE - I**
**(R20A1251) WEB DESIGNING TOOLS**

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## COURSE OBJECTIVES:

1.To learn the basics of web & html programming

2. To learn about CSS and its style

3.To learn about Java Scripting & Dynamic Html

4. To learn about web server software AJAX

5. To learn about PHP

**Unit I**

Web Basics- Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser,HTML-Introduction HTML-Basic Formatting Tags , HTML- Grouping Using Div Span, HTML-Lists,: HTML-Images, HTML-Hyperlink, HTML-Table, HTML-Iframe,HTML – Form HTML – Headers, HTML-Miscellaneous using tool Dreamweaver/ Visual studio

**Unit II**

CSS –Introduction, Syntax, CSS-Selectors, CSS-Color Background Cursor, CSS-Text Fonts, CSS-Lists Tables, CSS -Box Model, CSS-Display Positioning, CSS Floats. Using tool using tool Dreamweaver/ Visual studio, Net Bean

**Unit III**

Introduction of Java Script, JavaScript characteristics, Objects in Java Script, Dynamic HTML with Java Script. XMLHttpRequest- Introduction, XMLHttpRequest, The XMLHttpRequest Object, Events for the XMLHttpRequest Object, Request Object for XMLHttpRequest, Response Object for XMLHttpRequest. Using tool using tool Visual studio, Net Bean &Eclipse

**Unit IV**

AJAX Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax, CSS to Define Look and Feel, Understand the XML Mark-up, XMLHttpRequest. AJAX using XML and XML HttpRequest- Introduction, Ajax Using XML and XMLHttp

Request, Accessing, Creating and Modifying XML Nodes, Loading XML Data into an HTML Page, Receiving XML Responses, Handling Response XML. Using tool using tool Visual studio, Net Bean &Eclipse

**Unit V**

PHP Introduction- PHP Introduction, Structure of PHP, PHP Functions, AJAX with PHP, PHP Code and the Complete AJAX Example. AJAX with Database- Introduction, AJAX Database, Working of AJAX with PHP, Ajax PHP Database Form, AJAX PHP MySQL Select Query. Using tool using tool Visual studio, Net Bean & Eclipse.

## TEXT BOOKS:

1.Web Programming, Building Internet Applications, CHRIS BATES II Edition, Wiley Dreamtech.

2.Programming World Wide Web, SEBESTA,PEARSON.

**REFERENCE BOOKS:**

1. Internet and World Wide Web – How to program, Dietel and NietoPHI/Pearson
2. Ajax: The Complete Reference By ThomasPowell
3. PHP: The Complete reference-steven Holzner TataMcGraw-Hill.
4. An Introduction to web Design and Programming–Wang-Thomson
5. Web Warrior Guide to Web Programming-Bai/Ekedaw-Thomas
6. Beginning Web Programming-Jon DuckettWROX

**COURSE OUTCOMES:**

1. Ability to learn to webapplication.
2. To develop a own stylesheet
3. Ability to create a own java scripting webapplication.
4. Ability to create a own web design using ofAJAX
5. Ability to create a own web design using ofPHP

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| OPEN ELECTIVE - I |
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| **(R20A0551) INTRODUCTION TO DBMS** |

**COURSE OBJECTIVES**

1. To understand the basic concepts and the applications of database systems
2. To Master the basics of SQL and construct queries using SQL
3. To understand the relational database design principles
4. To become familiar with the basic issues of transaction processing and concurrency control
5. To become familiar with database storage structures and access techniques

**UNIT I: INTRODUCTION**

Database: Purpose of Database Systems,File Processing System Vs DBMS, History, Characteristic-Three schema Architecture of a database, Functional components of a DBMS.DBMS Languages-Database users and DBA.

**UNIT II: DATABASE DESIGN**

**ER Model**: Objects, Attributes and its Type. Entity set and Relationship set-Design Issues of ER model-Constraints. Keys- primary key, Super key, candidate keys. Introduction to relational model-Tabular, Representation of Various ER Schemas. ER Diagram Notations- Goals of ER Diagram- Weak Entity Set-Views.

**UNIT III: STRUCTURED QUERY LANGUAGE**

**SQL:** Overview, The Form of Basic SQL Query -UNION, INTERSECT, and EXCEPT– join operations: equi join and non equi join-Nested queries - correlated and uncorrelated- Aggregate Functions- Null values.Views, Triggers.

**UNIT IV - DEPENDENCIES AND NORMAL FORMS**

Importance of a good schema design,:- Problems encountered with bad schema designs, Motivation for normal forms- functional dependencies, -Armstrong's axioms for FD's- Closure of a set of FD's,-Minimal covers-Definitions of 1NF,2NF, 3NF and BCNF- Decompositions and desirable properties-

**UNIT V:**

Transactions: Transaction concept, transaction state, System log, Commit point, Desirable Properties of a Transaction, concurrent executions, serializability, recoverability, implementation of isolation, transaction definition in SQL, Testing for serializability, Serializability by Locks-Locking Systems with Several Lock Modes- Concurrency control by Timestamps, validation.

**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan,‖ Database System Concepts‖, McGraw- Hill, 6th Edition ,2010.

2. Fundamental of Database Systems, by Elmasri, Navathe, Somayajulu, andGupta, PearsonEducation.

**REFERENCE BOOKS:**

1. RaghuRamakrishnan, JohannesGehrke,-Database Management System**‖**, McGraw Hill., 3rd Edition2007.
2. Elmasri&Navathe,‖Fundamentals of Database System,‖ Addison-Wesley Publishing, 5th Edition,2008.
3. Date.C.J,-AnIntroductiontoDatabase**‖**,Addison-WesleyPubCo,8th Edition,2006.
4. Peterrob, Carlos Coronel, -Database Systems – Design, Implementation, and Management‖, 9th Edition, Thomson Learning, 2009.

**COURSE OUTCOMES:**

1. Understand the basic concepts and the applications of database systems
2. Master the basics of SQL and construct queries using SQL
3. Understand the relational database design principles
4. Familiarize with the basic issues of transaction processing and concurrency control
5. Familiarize with database storage structures and access techniques

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**OPEN ELECTIVE - I**
**(R20A0351) INTELLECTUAL PROPERTY RIGHTS**

**COURSE OBJECTIVES:**

1. To learn the basics, role, issues and agreement on trade aspects of IPR
2. To know the Parties to IP Rights
3. To learn how to ensure the value of IP
4. To learn about how to manage IP rights
5. To learn the remedies and IPR evaluation

**Unit-I**

Introduction: Intellectual property rights basics, the role and value of IP in international commerce, Issues affecting IP internationally. Agreement on trade related aspects of Intellectual Property Rights. (TRIPS) - Agreement on TRIPS andIndia.

**Unit-II**

Parties to IP Rights: Owner, customer, authorized user, licensee, attorney, protection of the weak and strong, finalizing ownership and use rights.

**Unit-III**

Ensuring the value of IP: Ensuring the value of IP at creation stage, after creation stage, precise contractual protection of IP rights. Key issues related to IP internationally. IP rights in international forums. Fundamentals in Country legal systems, generalities. Validity of IP rights locally: specifics.

**Unit-IV**

Managing IP Rights: Acquiring IP Rights: letters of instruction, joint collaboration agreement, work made for hire agreement - Protecting IP Rights: non disclosure agreement, cease and desist letter, settlement memorandum. Transferring IP Rights: assignment contract, license agreement, deed of assignment or license agreement, addendum to unrecorded assignment or license.

**Unit-V**

Remedies and IPR Evaluation - GATT - WTO - Role of WTO in solving IPR issues.

**REFERENCES:**

1. A short course in International Intellectual Property Rights – Karla C. Shippey, World Trade Press – 2$^{nd}$Edition.

2. Intellectual Property Rights – Heritage, Science, & Society under international treaties – A. Subbian, - Deep & Deep Publications – NewDelhi.

3. Intellectual Property Rights: N K Acharya: ISBN:9381849309

4. Intellectual Property Rights: C B Raju :ISBN-8183870341

5. Intellectual Property : Examples and Explanation – Stephen M McJohn, 2/e, ISBN-13: 978-0735556652

6. Intellectual Property Rights in the Global Economy – Keith E Maskus, PIIE, ISBN paper 0- 88132-282-2

**COURSE OUTCOMES**

1. Understand the basics, role, issues and agreement on trade aspects of IPR

2. Understand and identifying the Parties to IP Rights

3. Learn how to ensure the value of IP

4. Understand about how to manage IP rights

5. Learn the remedies and IPR evaluation

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| OPEN ELECTIVE - I |
| --- |
| **(R20A0051) ENTERPRISE RESOURCE PLANNING** |

**COURSE OBJECTIVES**

1. To know the basics of ERP
2. To understand the key implementation of ERP
3. To know the business modules of ERP
4. To learn about the post implementation of ERP
5. To evaluate the current and future trends in ERP

**UNIT 1**

**INTRODUCTION:** Overview and Benefits of ERP, ERP Related Technologies- Business Process Reengineering (BPR), Online Analytical Processing (OLAP), Supply chain Management (SCM). Applications of ERP.

**UNIT II**

**ERP IMPLEMENTATION:** Implementation and Product Lifecycle, Implementation Methodology, Planning Evaluation and selection of ERP systems, Organizing the Project Management and Monitoring. Case Study on Manufacturing.

**UNIT III**

**ERP MODULES:** Business modules in an ERP Package- Manufacturing, Human Resources, Plant Maintenance, Materials Management, Data Warehousing, Data Mining, Quality Management, Sales and Distribution. Case Study in Banking Sector.

**UNIT IV**

**POST IMPLEMENTATION:** Overview of ERP software solution. Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of ERP Implementation. Case Study of Success Story and Failure of Processing Sector.

**UNIT V**

**EMERGING TRENDS IN ERP:** Extended ERP system, ERP add–ons –Customer Relations Management (CRM), Customer satisfaction (CS). Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies. Case Study in Service Sector.

**TEXT BOOKS:**

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill,2008
2. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi,2000
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India,2009.

   REFERENCE BOOKS:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill,2008.
2. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India, 2nd edition,2006.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise ResourcePlanning", Thompson Course Technology, USA,2001.

**COURSE OUTCOMES:**

1. UnderstandthebasicsofERP
2. Understand the key implementation ofERP
3. Learn the business modules ofERP
4. Learn about the post implementation of ERP
5. Evaluating the current and future trends inERP

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| OPEN ELECTIVE - I |
| :---: |
| **(R20A0451)  BASICS OF COMPUTER ORGANIZATION** |

**COURSE OBJECTIVES:**

1.To understand basic components and operations in asystem

2.To understand the execution of an instruction in acomputer.

3.To acquire the knowledge to design ofCPU.

4.To explore the memoryorganization.

5.To explore I/O organization and parallel processing indepth.

**UNIT I**

**Basic Structure of Computers:** Computer Types, Functional Units, Computer Registers, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers. **Data Representation**: Fixed Point Representation, Floating – Point Representation.

**Register Transfer Language and Micro Operations:** RTL- Register transfers, Bus and Memory Transfers. **Micro operations:** Arithmetic, Logic, Shift micro operations, Arithmetic logic shift unit.

**UNIT-II**

**Computer Arithmetic:** Addition and Subtraction, Multiplication Algorithms, Division Algorithms. Error detection and Correction Codes

**Basic Computer Organization and Design:** Instruction codes, Timing and Control, Computer Instructions: Memory Reference Instructions, Register Transfer Instructions, Input– Output Instructions, Instruction cycle. Interrupt and Interrupt cycle, Complete Computer Description

**UNIT III**

**Central Processing Unit organization:** General Register Organization, Stack organization**,** Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, **CISC** and **RISC** processors.

**Control Unit Design:** Control Memory, Address sequencing, Design of CU: Micro Programmed Control, Hardware Control, Micro Program example. **Case Sudy-** Introduction to x86 architecture.

**UNIT IV**

**Memory Organization**: Memory Hierarchy, Memory Interleaving, **Main Memory-**RAM and ROM chips, **Associative Memory**-Hardware Organization, Match logic. Mapping functions- Associate, Direct, Set Associative Mapping. **Cache Memory**: Hit Ratio, Cache Coherence, Cache writes policies. **Auxiliary memory:** Magnetic Disks, Magnetic Tapes Optical devices, Page ReplacementAlgorithms.

**UNIT V**

**Input –Output Organization:** Peripheral Devices, Input-Output Subsystems, I/O Device Interface, I/O Processor, I/O Transfers–Program Controlled, Interrupt Driven, and DMA, Interrupts and Exceptions. I/O Device Interfaces – SCII, USB.

**Pipelining and Vector Processing:** Basic Concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards. Vector Processing: Applications, an Example for Vector Processing.

**TEXT BOOKS:**

1. ComputerSystemArchitecture‖by M.MorrisMano,3rdEdition.

2. ComputerOrganizationandDesign:TheHardware/SoftwareInterface‖,5thEditionby David A. Patterson and John L. Hennessy,Elsevier.

3. ComputerOrganizationandEmbeddedSystems‖,6thEditionby CarlHamacher, McGraw Hill HigherEducation.

**REFERENCE BOOKS:**

1. Computer Architecture and Organization‖,3rd Edition by JohnP. Hayes,WCB / McGraw-Hill

2. Computer Organization and Architecture: Designing for Performance‖,10th Edition by William Stallings, Pearson Education.

3. Computer System Design and Architecture‖,2nd Edition by Vincent P.Heuring and Harry F. Jordan, Pearson Education.

**COURSE OUTCOMES:**

1. Able to understand functional components and micro operations in a computer.

2. Able to understand arithmetic operations and computer instructions.

3. Able to understand CPU organization and design of control unit.

4. Able to understand the Memory organization.

5. Able to understand I/O Transfer and Parallel Processing.

## M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA

**II Year B.Tech. CSE(AI&ML)- II Sem** **L/T/P/C**

**0/-/3/1.5**

### (R20A0585)  OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

**COURSE OBJECTIVES:**

1. To prepare students to become familiar with the Standard Java technologies ofJ2SE

2. To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript

3. To train Students with good OOP programming breadth so as to comprehend, analyze, design and create novel products and solutions for the real life problems.

4. To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate java programming issues to broader application context.

5. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career

**Week 1**: Write a java program to find the Fibonacci series using recursive and non recursive functions
**Week 2**: Write a java program to multiply two given matrices.

**Week 3**: Write a java program for Method overloading and Constructor overloading
 **Week 4:** Write a java program to display the employee details using   Scanner class
 **Week 5:** Write a java program that checks whether a given string is palindrome or not
**Week 6:**
>        A)  Write a java program to represent Abstract class with example
>        B)  Write a java program to implement Interface using extends keyword

**Week 7:**
>        A)  Write a java program to create inner classes
>        B) Write a java program to create user defined package

**Week 8:**
>        A) Write a java program for creating multiple catch blocks
>        B) Write a java program for producer and consumer problem using Threads

**Week 9:** Write a Java program that implements a multi-thread application that has three threads
**Week 10**: A) Write a java program to display File class properties
>          B)Write a java program to represent Array List class
>          C)Write a Java program loads phone no, name from a text file using hash table

**Week 11:** Write an applet program that displays a simple message

**Week 12**: A) Write a Java program compute factorial value using Applet
>          B)Write a program for passing parameters using Applet

**Week 13**: Write a java program for handling Mouse events and Key events
**Week 14:** Write a java program that connects to a database using JDBC
**Week 15:**
>        A)  Write a java program to connect to a database using JDBC and insert values into it
>        B)  Write a java program to connect to a database using JDBC and delete values from it

**Week 16**: Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result

**COURSE OUTCOMES:**

1.  Upon successful completion of this course, the students will be able to:
2.  Able to analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.
3.  Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.
4.  Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per needs and specifications.
5.  Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs

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| II Year B.Tech. CSE(AI&ML)- II Sem | L/T/P/D/C |
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### (R20A0586) DATABASE MANAGEMENT SYSTEM LAB

**COURSE OBJECTIVES:**

1. To familiarize database design concepts using ER modelling and Relational model.
2. To enable students to use SQL to query database and perform all types of operations and understanding normalization and effective database design principles
3. To enable students to use Non-Relational DBMS and understand the usage of Document oriented and distributed databases.
4. To enable the students to use TCL and DCL Commands and perform all states of Transaction operations.
5. To familiarize issues of concurrency control and transaction management

**A.** Practice on SQL Queries to acquire knowledge on RDBMS.

**B. Case Study:**

**Objective:** This lab enables the students to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing, develop ing and querying a database in the context of example database -Roadway travels". Students are expected to use "Mysql" database.

**Roadway Travels:** "Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following areas:

- Reservations and Ticketing
- Cancellations
- Reservations & Cancellation:

Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One Passenger/person can book many tickets (to his/her family).

Cancellations are also directly handed at the booking office.

In the process of computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets, and Reservation and cancellation details. You should also develop query's using SQL to retrieve the data from the database.

The above Process involves many steps like

1. Analyzing the problem and identifying the Entities and Relationships,

2. E-R Model,

3. Relational Model

4. Normalization

5. Creating the database

6. Querying.

Students are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels. Examples are given at every experiment for guidance to students.

**WEEK 1:** E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Example:

Entities:
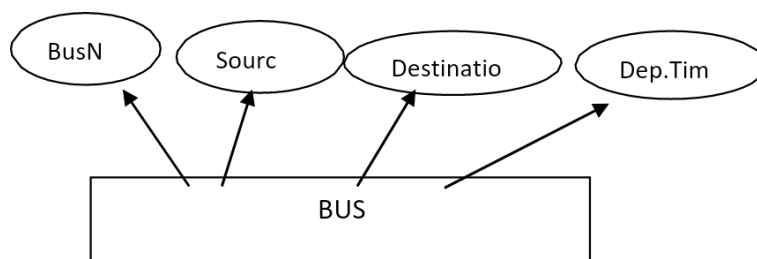1. B U S
2. Ticket
3. Passenger
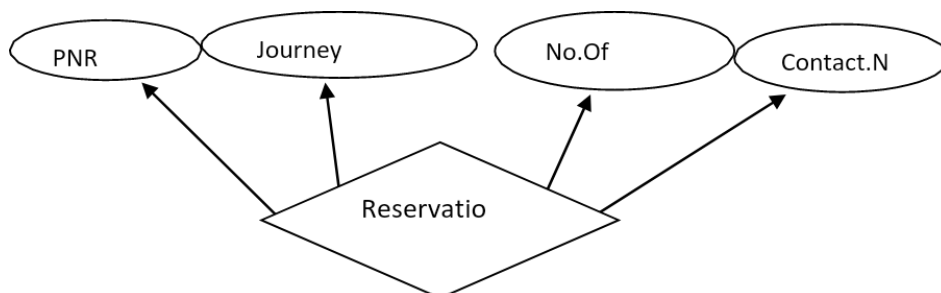
Relationships:
1. Reservation
2. Cancellation

PRIMARY KEY ATTRIBUTES:
1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)
3. Bus_NO(Bus Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.



Ex: Bus Entity



Ex: Reservation relationship

Note: The student is required to submit a document by writing the Entities and Keys to the lab teacher

**WEEK 2: Concept design with E-R Model Note**: -

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total/partial).Try to incorporate Generalization, Aggregation,

Specialization etc wherever required.

**Note**: The student is required to submit a document by drawing the E-R diagram to the lab teacher.

WEEK 3: Relational Model
Represent all the entities (Strong, Weak) in tabular fashion.

Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attribute as columns in tables or astablesbasedontherequirement. Different types of attributes (Composite, Multi-valued and Derived) have different way of Representation.

Example: The passenger looks as below .This is an example. You can add more attributes based on your E-R-Model

This is not normalized table.

PassengerName    Age    Sex    Address    Ticket_id    Passport ID

---

Note: The student is required to submit a document by represent relationships in a tabular fashion to the labteacher.

**WEEK 4: Normalization**

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain typesof logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization we can remove the multi valued attribute Ticket_id and place it in another table along with the primary key of passenger.

First Normal Form: The above table can be divided into two tables as shown below.

 Passenger Name                          Age    Sex    Address         Passport ID

---

---

---

Passport_id Ticket_id

---

---

You can do the second and third normal forms if required. Any how Normalized tables are given at the end.

**WEEK 5: Installation of Mysql / MongoDB / NoSQL and practicing DDL, commands**
Installation of MySql / MongoDB / NoSQL . In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases if not required. You will also try truncate, rename commands etc.

**Example for creation of a normalized "Passenger" table.**

CREATE TABLE Passenger ( Passport_id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL,

Age Integer Not NULL,Sex Char,Address VARCHAR (50) Not NULL);

Similarly create all other tables.

Note: Detailed creation of tables is given at the end**.**

**Installation of MongoDB**

 Installation of MongoDB on Windows,MongoDB is a cross-platform, document oriented database that provides, high performance, high availability, and easy scalability. MongoDB works on concept of collection and document. In this week You will Learn with MongoDB. How to create Database, Collection, Document, Field, Embedded Documents. Relationships in MongoDB represent how various documents are logically related to each other. Relationships can be modeled via **Embedded** and **Referenced** approaches.

**Eg:** MongoDB **db.createCollection(name, options)** is used to create collection.

**Basic syntax of createCollection() method**

>use test

switched to db test

>db.createCollection("mycollection")

{ "ok" : 1 }

>

 created collection by using the command show collections.

>show collections

mycollection

    system.indexes

**Installation of NoSQL**

NoSQL is a non-relational database management Systems, different from traditional relational database management systems. It is designed for distributed data stores where very large scale of data storing needs.for example Google or Facebook which collects terabits of data every day for their users. Stands for Not Only SQL , No declarative query language, No predefined schema, Key-Value pair storage, Column Store, Document Store, Graph databases, Eventual consistency rather ACID property, Unstructured and unpredictable data, CAP Theorem, Prioritizes high performance, high availability and scalability, BASE Transaction

**Key Value Pair Based**

Data is stored in key/value pairs. It is designed in such a way to handle lots of data and heavy load.

Key-value pair storage databases store data as a hash table where each key is unique, and the value can be a JSON, BLOB(Binary Large Objects), string, etc.

For example, a key-value pair may contain a key.

| Key | Value |
| --- | --- |
| Name | Joe Bloggs |
| Age | 42 |
| Occupation | Stunt Double |
| Height | 175cm |
| Weight | 77kg |

Redis, Dynamo, Riak are some examples of key-value store DataBases. They are all based on Amazon's Dynamo paper.

**Column-based NoSQL databases** are widely used to manage data warehouses, business intelligence, CRM, Library card catalogs,

| ColumnFamily | | | |
| --- | --- | --- | --- |
| Row Key | Column Name | | |
| | Key | Key | Key |
| | Value | Value | Value |
| | Column Name | | |
| | Key | Key | Key |
| | Value | Value | Value |

HBase, Cassandra, HBase, Hypertable are examples of column based database.

**Document-Oriented:**

Document-Oriented NoSQL DB stores and retrieves data as a key value pair but the value part is stored as a document. The document is stored in JSON or XML formats. The value is understood by the DB and can be queried.

| Col1 | Col2 | Col3 | Col4 |
| --- | --- | --- | --- |
| Data | Data | Data | Data |
| Data | Data | Data | Data |
| Data | Data | Data | Data |

Document 1
```
{
 "prop1": data,
 "prop2": data,
 "prop3": data,
 "prop4": data
}
```

Document 2
```
{
 "prop1": data,
 "prop2": data,
 "prop3": data,
 "prop4": data
}
```

Document 3
```
{
 "prop1": data,
 "prop2": data,
 "prop3": data,
 "prop4": data
}
```

**Graph-Based**

A graph type database stores entities as well the relations amongst those entities. The entity is stored as a node with the relationship as edges. An edge gives a relationship between nodes. Every node and edge has a unique identifier.
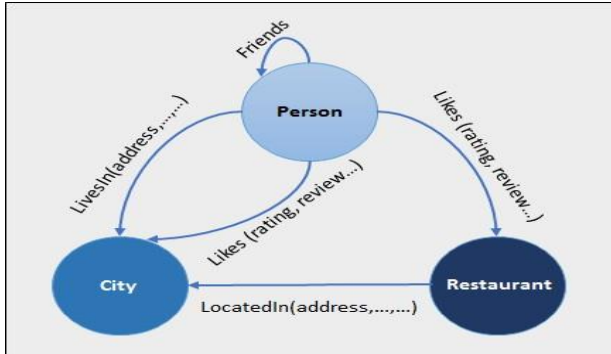


**Experiment 6: Practicing DML commands**

DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from the a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for The records remain

Inserting values into "Bus" table:

Insert into Bus values(1234,'hyderabad', 'tirupathi');

Insert into Bus values (2345,'hyderabd' 'Banglore');

Insert into Bus values (23,'hyderabd','Kolkata');

Insertinto Busvalues(45,'Tirupathi,'Banglore');

Insertinto Bus values (34,'hyderabd','Chennai');

Inserting values into "Passenger" table:

Insert into Passenger values (1, 45,'ramesh', 45,'M', 'abc123');

Insert into Passenger values (2, 78,'geetha', 36,'F','abc124');

Insert into Passenger values (45, 90,' ram', 30,'M','abc12');

Insert into Passenger values (67, 89,' ravi', 50,'M','abc14');

Insert into Passenger values (56, 22,'seetha', 32,'F','abc55');


Few more Examples of DML commands:

Select * from Bus; (selects all the attributes and display) UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

### WEEK 7: Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:
Display unique PNR_no of all Passengers. Display all the names of male passengers. Display the ticket numbers and names of all the passengers.

Find the ticket numbers of the passengers whose name start with 'r' and ends with 'h'. Find the names of passengers whose age is between 30 and 45.

Display all the passengers names beginning with 'A' Display the sorted list of passengers names

### WEEK 8 and WEEK 9: Querying (continued...)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Write a Query to display the Information present in the Passenger and cancellation tables. Hint: Use UNION Operator.

Display the number of days in a week on which the 9W01 bus is available.

Find number of tickets booked for each PNR_no using GROUP BY CLAUSE. Hint: Use GROUP BY on PNR_No.

Find the distinct PNR numbers that are present.

Find the number of tickets booked by a passenger where the number of seats is greater than 1.Hint: Use GROUP BY, WHERE and HAVING CLAUSES.

Find the total number of cancelled seats.

### WEEK 10: Triggers

In this week you are going to work on Triggers. Creation of insert trigger, delete trigger, update trigger. Practice triggers using the above database.

Eg: CREATE TRIGGER updcheck BEFORE UPDATE ON passenger FOR EACH ROW BEGIN IF NEW.Tickent N0 > 60 THEN SET New.Tickent no = Ticket no;
ELSE SET New.Ticket no = 0;
END IF;
END;

**WEEK 11**: Stored Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

Eg: CREATE PROCEDURE myProc()
      BEGIN
SELECT COUNT(Tickets) FROM Ticket WHERE age>=40;
 End;

**WEEK 12: PL/SQL**

In this session you are going to learn PL/SQL programs with Oracle Database

**WEEK 13: DCL Commands**

DCL commands are used to for granting the permissions for security of data within the users.

**REFERENCE BOOKS:**

1. Introduction to SQL,Rick F.Vander Lans,Pearson education..

2. Oracle PL/SQL, B.Rosenzweig and E.Silvestrova,Pearson education.

3. Oracle PL/SQL Programming,Steven Feuerstein,SPD.

4. SQL & PL/SQL for Oracle 10g,B lack Book, Dr.P.S.Deshpande, Dream Tech.

5. Ora cle D atab a se 11 g P L/S QL P ro gra m ming, M .M c Laughlin,TMH.

6. SQL Fundamentals, J.J.Patrick,Pearson Education.


**COURSE OUTCOMES:**

    The students will be able:

1.  To design a database based on the requirements by applying ER and Relational model.
2.  To use normal forms for Schema Refinement and Transaction Management and SQL to interact with database to perform all types of DB operations.
3.  To analyze the business requirements and produce a viable model for the implementation
     of document oriented and distributed databases.
4.  To apply TCL and DCL Commands and to visualize all states of transaction operations.
5.  Analyze and Select storage and recovery techniques of database system

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| (R20A0008) GLOBAL EDUCATION AND PROFESSIONAL CAREER |
|---|

**Introduction**

In every era of human life, studying abroad has allowed one to experience another part of oneself in a different setting. Additionally, if all that hurry is geared towards success in one's career, international education will most definitely be worth one's time. It is not only an expedition of self-discovery but also an investment in one's resume.

The world, today, is redefining  knowledge and great leadership to encompass critical values that are key to meeting modern career challenges. To meet the current requirements, a study delineating Global Education is of utmost importance towards prospective growth.

**Course Objectives:**

1. To assist students to understand the broad scope of engineering.
2. To equip the students to study the academic subjects with better perspective of the expectations of the international standards
3. To familiarize students with the financial requirements and ways to receive monetary aid
4. To enable students' understanding of the various admission tests
5. To acquaint them with their own skill set and train the students towards skills development

**Unit 1**

Importance and relevance of Engineering in today's and futuristic contexts.

The jobs that will thrive in the market in the coming decades. For eg., Robot Manufacturer &service

Management, Big Data & AI Scientists, Artificial Bodies Manufacturer, Gene Designers, etc

**Unit 2**

Countries and their entry requirements

Non-immigrant student visas, Work Permit visas

**Unit 3**

Admission tests to colleges and universities world-over

PSAT, SAT, TOEFL, AP, IELTS…

**Unit 4**

Financial capacity requirements

Scholarships, Full scholarships, merit scholarships, on-campus jobs

**Unit 5**

Skills Mapping

Match one's skills with jobs, Skills development

**COURSE OUTCOMES**

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

1. Comprehend the usage of engineering in various fields and disciplines.

2. Identify the right college and country to pursue higher education.

3. Prepare themselves for the skill-oriented academics and prospective growth.

4. Plan for their future education with the precise financial management.

5. Discover and discuss their skill set and the jobs that map their skills.

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**III Year B.Tech. CSE(AI&ML)- I Sem**                                **L /T/P/D/ C**
                                                                      **3/-/-/-/3**

| (R20A0511) SOFTWARE ENGINEERING |
|---|

**COURSE OBJECTIVES:**

1.    To provide the idea of decomposing the given problem into Analysis, Design, Implementation,Testing and Maintenance phases

2.    To understand software process models such as waterfall and evolutionary models andsoftware requirements and SRS document.

3.    To understand different software design and architectural styles & software testing approachessuch as unit testing and integration testing.

4.    To understand quality control and how to ensure good quality software through qualityassurance.

5.   To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in an object oriented software projects.

**UNIT - I:**

Introduction to Software Engineering: The evolving role of software, software characteristics, software Applications.A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).
Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process, Agile Development Models.

**UNIT - II:**

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.
Requirements engineering process: Feasibilitystudies, Requirements elicitation and analysis, Requirements validation, Requirements management.
System models: Context Models, Behavioral models, Data models, Object models, structured methods.

**UNIT - III:**

Design Engineering: Design process and Design quality, Design concepts, the design model.
Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging .Case Study software testing tool Junit / Selenium tool

**UNIT - IV:**

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMMPlan , Software cost estimation model cocomo model
Quality Management: Software Quality, Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**UNIT - V:**

**Object-Oriented Software Engineering:** Object-Oriented Analysis**,** Domain Analysis, Generic Components of the OO Analysis Model, The OOA Process, The Object-Relationship Model, The Object-Behavior Model, Case Study – ATM Management System.

**TEXT BOOKS :**
1. Software Engineeringa practitioner's Approach, Roger S Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education.

**REFERENCE BOOKS :**
1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI,2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1:Abstraction and modelling, Diner Bjorner, Springer International edition,2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition2006.
7. Software Engineering Foundations, Yingux Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley & SonsLtd.
9. Software Engineering3: Domains, Requirements, and Software Design, D. Bjorner, Springer International Edition.
10. Introduction to Software Engineering, R. J. Leach, CRC Press.

**COURSE OUTCOMES:**
1. Ability to decompose the given project in various phases of a lifecycle
2. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
3. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
4. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.
5. Ability to apply the knowledge, techniques, and skills in the development of a software product

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                                                                                **3/-/-/-/3**

| **(R20A0510)COMPUTER NETWORKS** |
|---|

**OBJECTIVES:**
1. To introduce the fundamental types of computer networks.
2. To demonstrate the TCP/IP & OSI model merits &demerits.
3. To know the role of various protocols in Networking.
4. To know about different error and flow controls
5. To know about Application layers

**UNIT - I:**
**Introduction:** Network, Uses of Networks, Types of Networks, Reference Models: TCP/IP Model, The OSI Model, and Comparison of the OSI and TCP/IP reference model.
**Physical Layer:** Guided transmission media, Wireless transmission media, Switching

**UNIT - II:**
**Data Link Layer** - Design issues, Error Detection & Correction, Elementary Data Link Layer Protocols, and Sliding window protocols.Multiple Access Protocols - ALOHA, CSMA, CSMA/CD, CSMA/CA, Collision free protocols,Ethernet- Physical Layer, Ethernet Mac Sub layer.

**UNIT - III:**
**Network Layer**: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks, routing algorithms: optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Link State Routing, Path Vector Routing, Hierarchical Routing; Congestion control algorithms,IP addresses, CIDR, Sub netting, Super Netting, IPv4, Packet Fragmentation, IPv6 Protocol, Transition from IPv4 to IPv6, ARP, RARP.

**UNIT - IV:**
**Transport Layer:** Services provided to the upper layers elements of transport protocol, addressing, connection establishment, Connection release, Error Control & Flow Control,
Crash Recovery.
**The Internet Transport Protocols:** UDP, Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Sliding Window, The TCP Congestion Control Algorithm.

**UNIT - V:** Application Layer- Introduction, providing services, Applications layer paradigms: Client server model, HTTP, E-mail, WWW, TELNET, DNS.

**TEXT BOOKS:**
1. Computer Networks - Andrew S Tanenbaum, 4th Edition, PearsonEducation.
2. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

**REFERENCES BOOKS:**
1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd
Edition, PearsonEducation.

**COURSE OUTCOMES:**
1.  Students should be understand and explore the basics of Computer Networks and Various Protocols.
2.  Student will be in a position to understand the World Wide Web concepts.
3.  Students will be in a position to administrate a network and flow of information further.
4.  Student will be in position know various application layers.
5.  Student will be know how work with error handlings.

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                                                              **3/-/-/3**

### (R20A0512)COMPILER DESIGN

**COURSE OBJECTIVES**:

1. To provide an initial Understanding of language translators

2. The Knowledge of principles, techniques and tools used in compiler construction

3. Use of available automated tools in compilers construction.

4. Knowledge of how to optimize the compilers

5. Provides techniques for generating cross compilers through Bootstrapping

**UNIT-I**

**Language Translation**- introduction, basics, steps involved in atypical language processing system, Types of translators, Compilers- overview, phases, Pass and Phases of translation, bootstrapping, data structures in compilation. Lexical Analysis (Scanning)- Functions of scanner, Specification of tokens- Regular expressions and Regular grammars for common PL constructs. Recognition of Tokens- Finite Automata in recognition and generation of tokens. Scanner generators- Lexical analyzer generators, LEX. **Syntax Analysis (Parsing)**- Functions of a parser, Classification of parsers. Context free grammars in syntax specification, benefits and usage in compilers.

**UNIT-II**

Top down parsing–Definition, types of top down parsers- Backtracking, Recursive descent, Predictive, LL (1), Preprocessing the grammars used in top down parsing, Error recovery, and Limitations. Bottom up parsing- Definition, Handle pruning. Types of bottom up parsers- Shift Reduce parsers, LR parsers- LR(0), SLR, CALR and LALR parsing, Error recovery, Handling ambiguous grammars, Parser generators- yet another compiler compiler(YACC).

**UNIT-III**

Semantic analysis-Attributed grammars, Syntax directed definition and Translation schemes, Type checker: functions, type expressions, type systems, types checking of various constructs. Intermediate Code Generation-Functions, intermediate code forms- syntax tree, DAG, Polish notation, and Three address codes. Translation of different source language constructs into intermediate code. Symbol Tables- Definition, contents, and formats to represent names in a Symbol table. Different approaches of symbol table implementation for block structured and non block structured languages, such as Linear Lists, Self Organized Lists, and Binary trees, Hashing based STs.

**UNIT-IV**

Runtime Environment- Introduction, Activation Trees, Activation Records, and Control stacks. Runtime storage organization- Static, Stack and Heap storage allocation. Storage allocation for arrays, strings, and records etc. Code optimization- goals and Considerations, and Scope of Optimization, Machine dependent and independent optimizations, Local optimizations, DAGs, Loop optimization, Global Optimizations. Common optimization techniques- Folding, Copy propagation, Common Sub expression eliminations, Code motion, Frequency reduction, Strength reduction etc

**UNIT-V**

Control flow and Data flow analysis- Flow graphs, Data flow equations, global optimization-Redundant sub expression elimination, Induction variable eliminations, Live Variable analysis. Object code generation- Object code forms, machine dependent code optimization, register allocation and assignment, Algorithms- generic code generation algorithm and other modern algorithms, DAG for register allocation.

**TEXT BOOKS:**

1. Compilers, Principles, Techniques, and Tools – Alfred.V Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman ; 2nd or later editions, Pearson Education.
2. Modern Compiler implementation in C - Andrew N.Appel Cambridge University Press.

**REFERENCES:**

1. lex & yacc , -John R Levine, Tony Mason, Doug Brown; O'reilly.
2. Compiler Construction,- LOUDEN, Thomson.
3. Engineering a compiler – Cooper & Linda, Elsevier
4. Modern Compiler Design – Dick Grune, Henry E.Bal, Cariel TH Jacobs, Wiley Dreamtech

**COURSE OUTCOMES:**

5. By the end of the semester, the student will be able to :
6. Understand the essence of different language translators.
7. Design different components (phases) of a compiler by hand.
8. Apply different optimization techniques in compiler construction.
9. Solve problems, Write Algorithms,Programs and test them for the results.
10. Use the compiler construction tools Lex, and Yacc in compiler construction.

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III Year B.Tech. CSE(AI&ML)- I Sem                                                      L/T/P/D/C
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| (R20A0518) MACHINE LEARNING |
|---|

**COURSE OBJECTIVES:**

The students will be able:

**1.** To introduce the basic concepts and techniques of machine learning and the need for Machine learning techniques for real world problem

**2.** To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms

**3.** To understand, learn and design simple artificial neural networks for the selected problem

**4.** To gain skills of how to combine multiple machine learning algorithms to solve the selected problem

**5.** To understand deep belief networks and applications

**UNIT-1**

**INTRODUCTION**

Machine-Learning Paradigms: Introduction. Machine Learning Systems, Forms of Learning:SupervisedandUnsupervisedLearning,reinforcement – theory of learning – feasibility of learning – Data Preparation– training versus testing and split.

**Supervised Learning:**

**Regression:**Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods.

**UNIT-2**

**Classification:** – support vector machines – soft margin SVM – going beyond linearity – generalization and over fitting – regularization – validation-Naïve Bayesclassification,Ensemble Learning: BOOSTING - AdaBoost –Stumping- Gradient Boosting Machines and XGBoost -BAGGING - Subagging -Different Ways to Combine Classifiers-Random forest Classifier

**UNIT-3**

**Unsupervised learning**

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees – locality sensitive hashing – non-parametric regression.

Clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rulelearning

**UNIT-4**

Dimensionality Reduction - Linear Discriminant Analysis – Principal Component Analysis – Covariance's - limitations of PCA-Computing PCA .

**Reinforcement learning**

Reinforcement learning- Example: Getting Lost -State and Action Spaces - Carrots and Sticks: The Reward Function -Discounting -Action Selection - Policy –MARKOV DECISION PROCESSES - The Markov Property - Probabilities in Markov Decision Processes

**UNIT-5**

Neural Networks - The Perceptron -The Perceptron Learning Algorithm - LINEAR SEPARABILITY: The Perceptron Convergence Theorem - The Exclusive or (XOR) Function

BACK-PROPAGATION OF ERROR : The Multi-layer Perceptron Algorithm -Different Output Activation Functions -Sequential and Batch Training - Local Minima -Picking Up Momentum-Minibatches and Stochastic Gradient Descent- A Regression Problem - Classification with the MLP .

**TEXT BOOKS:**

1. MACHINE LEARNING An Algorithmic Perspective 2$^{nd}$ Edition,Stephen Marsland,2015, by Taylor & Francis Group, LLC
2. Introduction to Machine Learning ,The Wikipedia Guide

**REFERENCE BOOKS:**

1. IntroductiontoMachineLearning, SecondEdition, EthemAlpaydın, the MIT Press, Cambridge, Massachusetts, London, England.
2. Machine Learning , Tom M. Mitchell, McGraw-Hill Science,ISBN: 0070428077
3. Understanding Machine Learning:From Theory to Algorithms, c 2014 by Shai Shalev-Shwartz and Shai Ben-David, Published 2014 by Cambridge University Press.

**COURSE OUTCOMES:**

The students will be able:

1. Apply machine learning techniques in the design of computer systems
2. To differentiate between various categories of ML algorithms
3. Design and make modifications to existing machine learning algorithms to suit an individual application to improve classification accuracy
4. Able to design deep neural networks
5. Design systems that use appropriate graph models of machine learning

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| (R20A6601)  IMAGE PROCESSING |
| :---: |
| (PROFESSIONAL ELECTIVE-I) |

### OBJECTIVES:

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. Provides the knowledge of imageacquisition;samplingandquantization.
3. Preprocessing and enhancement.
4. Image restoration, and segmentation.
5. Knowledge of different image compression techniques.

### UNIT - I

**Digital ImageFundamentals:** Digital Image through Scanner, Digital Camera. Concept of Gray Levels, Gray Level to Binary Image Conversion, Sampling and Quantization, Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT andSVD.

### UNIT - II

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

### UNIT - III

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

### UNIT - IV

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

### UNIT - V

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

### TEXT BOOKS:

1. Digital Image Processing: **R.C. Gonzalez & R. E. Woods**, Addison Wesley/ Pearson Education, 2$^{nd}$ Ed,2004.

### REFERENCES:

1. Fundamentals of Digital Image Processing: **A. K. Jain** ,PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India,2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3$^{rd}$Edition,2004.
4. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, aclav Hlavac and Roger Boyle, Cengage learning.
5. Digital Image Processing, W.K.Pratt, 4$^{th}$editionJohnwiley&sons.
6. Digital ImageProcessing, S.Jayaraman, S.Esakkirajan, T.Veerakumar,TMH.
7. Digital Image Processing, S.Sridhar, Oxford UniversityPress

**COURSE OUTCOMES:**

1. Understand the theoretical and mathematical foundations of Digital Image Processing.
2. Explain different imageacquisition,samplingandquantization methods;
3. Perform Preprocessing and image enhancement operations on given images
4. Apply different Image restoration, and segmentation techniques.
5. Perform different image compression techniques.

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| (R20A0527) SCRIPTING LANGUAGES |
| :---: |
| (PROFESSIONAL ELECTIVE-I) |

**COURSE OBJECTIVES:**
1. To study the basics of scripting languages like Java script, Perl, PHP and Ruby
2. To understand the requirements of Scripting Languages
3. To identify the uses of Scripting Languages
4. To introduce in-depth knowledge of programming features of Perl and Angular JS
5. To state the implementation and applications of Scripting.

**UNIT I**
Introduction to Scripts and Scripting Language – Scripts and Programs, Origins of Scripting, Uses for Scripting Languages, Web Scripting.
JavaScript: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects.

**UNIT II**
JavaScript programming of reactive web pages elements - Events, Event handlers, Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms.
Introduction to Angular JS – Development Tools, Basic Program, Angular Modules and Controllers.

**UNIT III**
Introduction to PERL- Names and Values, Variables and Assignments, Scalar Expressions, Control Structures, Built-in Functions, Collections of Data, Arrays and Lists, Hashes, Strings, Patterns, and Regular Expressions.

**UNIT IV**
Advanced PERL: Finer points of looping, data structures, Security Issues
PHP Basics - Features, Data Types, Variables, Operators, Arrays, Strings, Control structures, Loops, Functions, Date & Time, File Handling, Form handling.
**UNIT V**
Ruby – Features, Classes and Objects, Variables, Operators, Comments, If-else, Loops, Methods, Blocks, Modules, Arrays, Strings, Hashes, Date & Time, Ranges, Iterators, File I/O, Exceptions

**TEXT BOOKS:**
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites 3rd Edition, O'Reilly Publications

**REFERENCE BOOKS:**
1. The Ruby Programming Language, David Flanagan and Yukihiro Matsumoto, O'Reilly Publications
2. AngularJS Programming by Example (Kindle Edition) by Kurniawan, AgusKurniawan
3. Beginning JavaScript with Dom scripting and AJAX, Russ Ferguson, Christian Heilmann, Apress.

**COURSE OUTCOMES:**

Students will be able to:
1. To differentiate the typical scripting languages and application programming languages.
2. To implement the design of programs for simple applications.
3. To classify the Angular Modules
4. To specify the Controllers used in Angular JS
5. To create software systems using scripting languages such as Perl, PHP, and Ruby

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| (PROFESSIONAL ELECTIVE-I) |
| :---: |
| **(R20A0515) TEXT ANALYTICS** |

**COURSE OBJECTIVES Describe text extraction techniques.**
1. Differentiate clustering and classification techniques on text.
2. Analyze visualization methodologies.
3. Illustrate about event detection methods and embedding semantics in models.
4. Compare feature extraction methods

**UNIT-I: TEXT EXTRACTION**

Text Extraction: Introduction, Rapid automatic keyword extraction: candidate keywords, keyword scores, adjoining keywords, extracted keywords, Benchmark evaluation: precision and recall, efficiency, stop list generation, Evaluation on new articles.

**UNIT-II: CLUSTERING**

Clustering: Multilingual document clustering: Multilingual LSA, Tucker1 method, PARAFAC2 method, LSA with term alignments, LMSA, LMSA with term alignments.

**UNIT-III: CLASSIFICATION**

Classification: Content-based spam email classification using machine-learning algorithms, Utilizing nonnegative matrix factorization for email classification problems, Constrained clustering with k-means type algorithms.

**UNIT-IV: ANOMALY AND TREND DETECTION**

Anomaly and trend detection: Text Visualization techniques such as tag clouds, authorship and change tracking, Data Exploration and the search for novel patterns, sentiment tracking, visual analytics and Future Lens, scenario discovery, adaptive threshold setting for novelty mining.

## UNIT-V: TEXT STREAMS

Text streams: Introduction, Text streams, Feature extraction and data reduction, Event detection, Trend detection, Event and trend descriptions, Embedding semantics in LDA topic models: Introduction, vector space modeling, latent semantic analysis, probabilistic latent semantic analysis, Latent Dirichlet allocation, embedding external semantics from Wikipedia, data-driven semantic embedding.

**TEXT BOOKS**
1.    Michael W. Berry & Jacob Kogan ,"Text Mining Applications and Theory", Wiley publications.
2.    Aggarwal, Charu C., and Cheng Xiang Zhai, eds. mining text data. Springer Science & Business Media, 2012.

**REFERENCE BOOKS**
1.    Miner, Gary, et al. Practical text mining and statistical analysis for non-structured text data applications. Academic Press, 2012.
2.    Srivastava, Ashok N., and Mehran Sahami. Text mining: Classification, clustering, and applications,
Chapman and Hall/CRC, 2009.
2.    Buitelaar, Paul, Philipp Cimiano, and Bernardo Magnini, eds. Ontology learning from text: methods,
evaluation and applications. Vol. 123. IOS press, 2005.

**COURSE OUTCOMES**
Upon completion of this course, the students will be able to:
1.  Design text extraction techniques.
2.  Design clustering techniques for text.
3.  Design classification techniques for text
4.  Practice visualization methodologies using tools.
5.  Practice feature extraction using tools

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## OPEN ELECTIVE – II
### (R20A1252) MANAGEMENT INFORMATION SYSTEMS

**COURSEOBJECTIVES**:

    To understand the importance of MIS, structure and types of MIS

    To learn business applications of Information Systems

    To learn about the Management of Information Systems

    To learn how to build Information Systems

    To know about Cyber crime

**UNIT-I:**

Introduction : MIS importance, definition, nature and scope of MIS, Structure and Classification of MIS, Information and Systems Concept, Types of Information, Information systems for competitive advantage.

Case Study: MIS at any business establishment.

**UNIT-II:**

Business Applications of Information Systems: E-Commerce, ERP Systems, DSS, Business Intelligence and Knowledge Management System.

Case Study: Knowledge Management Systems at an Enterprise.

**UNIT-III:**

Management of IS: Information system planning, system acquisition, systems implementation, evaluation & maintenance of IS, IS Security and Control.

Effectiveness of MIS: A Case Study.

**UNIT-IV:**

Building of Information Systems: System Development Stages, System Development Approaches. Systems Analysis and Design-Requirement Determination, Strategies for Requirement Determination. Structured Analysis Tools, System Design – Design Objectives, Conceptual Design, and Design Methods. Detailed system design.

**UNIT-V:**

Introduction to Cyber Crime: Cyber Crime Definition and orgin of the word,cyber crime and information security, cyber criminals. Classification of cyber criminals-Legal Perspectives-Indian Perspectives-Cyber crimes and ndian ITA 2000,Global perspective on cybercrime-Cybercrime era.(Refer : Nina Godbole et al)

**TEXT BOOKS:**

1) D P Goyal, Management Information Systems–Managerial Perspective, MacMillan, 3$^{rd}$ Edition, 2010.

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**REFERENCES:**
- Nina Godbole & Sunit Belapure " Cyber Security" Wiley india2012.
- Jawadekar, MIS Text and Cases, TMH,2012.
- Dr Milind M Oka "Cases in Management Information system 'Everest,2012.
- A K Gupta, Sharma "Management of Systems" Macmillan,2012.
- Sandra Senf "Information Technology Control and Audit" 3e, CRC Press,2012.
- Apache OFBiz for Ecommerce and ERP –https://ofbiz.apache.org/
- Magneto for Ecommerce (B2B Commerce) –https://magento.com/
- Adempiere – ERP :http://www.adempiere.net/web/guest/welcome
- Analytica – DSS –http://www.lumina.com
- OpenRules – Business Rules and Decision Management system –http://openrules.com/

**COURSE OUTCOMES**:
- Understand the importance of MIS, structure and types of MIS
- Understand business applications of Information Systems
- Learning about the Management of Information Systems
- Learning about how to build Information Systems
- Knowing about Cyber crime

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## OPEN ELECTIVE - II
### (R20A0552) JAVA PROGRAMMING

**COURSE OBJECTIVES**:

This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, students should be able

- To create Java programs that leverage the object-oriented features of the Java language, such asencapsulation, inheritance and polymorphism;
- Use data types, arrays and strings;
- Implement error-handling techniques using exception handling,
- To know about Applets and Event Handling
- Create and event-driven GUI using AWT components.

### UNIT I

OOP Concepts: Data abstraction, encapsulation, inheritance, Polymorphism, classes and objects, Procedural and object oriented programming paradigms.

Java Basics History of Java, Java buzzwords, data types, variables, constants, scope and life time of variables, operators, expressions, control statements, type conversion and casting, simple java programs, concepts of classes, objects, arrays, strings, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, Buffered Reader class, Scanner class, String Tokenizer class, innerclass.

### UNIT II

Inheritance – Types of Inheritance, super keyword, and preventing inheritance: finalclasses and methods. Polymorphism – Dynamic binding, method overriding, abstract classes and methods. Interfaces-Interfaces Vs Abstract classes, defining an interface, implement interfaces, extending interface.

Packages- Defining, creating and accessing a package, importing packages.

### UNIT III

Exception handling - Concepts of exception handling, benefits of exception handling, exception hierarchy, and usage of try, catch, throw, throws and finally, checked exceptions and unchecked exceptions, built in exceptions.

Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizingthreads, inter thread communication.

### UNIT IV

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Event Handling: Events, Handling mouse and keyboard events, Adapter classes. Files- Streams- Byte streams, Character streams, Text input/output.

### UNIT V

GUI Programming with Java – AWT class hierarchy, component, container, panel, window, frame, graphics. AWT controls - Labels, button, text field, check box, and graphics. Layout Manager – Layout manager types: border, grid and flow. Swing – Introduction, limitations of AWT, Swing vs AWT.

**TEXT BOOKS:**
- Java- the complete reference, 7th editon, Herbertschildt,TMH.
- Understanding OOP with Java, updated edition, T. Budd,pearsoneduction.
- Core Java an integrated approach, dreamtech publication, Dr.R.NageswaraRao.

**REFERENCE BOOKS**:
- Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program , P.J.Deitel andH.M.Deitel,PHI
- Object Oriented Programming through Java, P. Radha Krishna, Universities Press.

**COURSE OUTCOMES**:
- An understanding of the principles and practice of object oriented programming and design in theconstruction of robust, maintainable programs which satisfy their requirements;
- A competence to design, write, compile, test and execute straightforward programs using a highlevel language;
- An awareness of the need for a professional approach to design and the importance of gooddocumentation to the finished programs.
- Be able to make use of members of classes found in the Java API.
- Demonstrate the ability to employ various types of constructs and a hierarchy of Java classes toprovide solution to a given set of requirements.

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**OPEN ELECTIVE - II**
**(R20A1253) SOFTWARE PROJECT MANAGEMENT**

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**COURSE OBJECTIVES:**

The Main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience - based creation & improvement of models (process management). The Objectives of the course can be characterized as follows:

1. To understand the specific roles within a software organization as related to project and process management
2. To understand the basic infrastructure competences (e.g., process modeling and measurement)
3. To understand the basic steps of project planning, project management, quality assurance, and
4. process management and their relationships
5. To understand the Flow Process and Check points of the process.
6. To understand Project Organizations and Responsibilities

**UNIT-I**

Conventional Software Management: The waterfall Model, Conventional Software Management Performance, evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation. Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

**UNIT-II**

Conventional And Modern Software Management: Principles of Conventional Software Engineering, Principles of Modern Software Management, Transitioning to an interactive Process, Life Cycle Phases: Engineering and Production Stages Inception, Elaboration, Construction, Transition phases .

**UNIT-III**

Artifacts of the Process: The Artifact Sets. Management Artifacts, Engineering Artifacts, Programmatic Artifacts. Model Based Software Architectures: A Management Perspective and Technical Perspective.

**UNIT-IV**

Flows of the Process: Software Process Workflows, Iteration workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic Status Assessments. Interactive Process Planning: Work Breakdown Structures, Planning Guidelines, Cocomo Cost Estimation model.

**UNIT-V**

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, and Evolution of Organizations. Process Automation Building Blocks, the Project Environment. Project Control and Process Instrumentation: Seven Core Metrics, Management Indicators, Quality Indicators, Life Cycle Expectations Pragmatic Software Metrics Automation.

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**TEXT BOOKS:**

1. WalkerRoyce,‒SoftwareProjectManagement**‖**,1998,PEA.
2. Henry,‒SoftwareProjectManagement**‖**,Pearson.

**REFERENCE BOOKS:**

1. Richard H.Thayer.‖ Software Engineering Project Management‖, 1997, IEEE Computer Society.
2. ShereK.D.:‒Software EngineeringandManagement**‖**,1998,PHI.
3. S.A.Kelkar,‒Software Project Management: A Concise Study**‖**,PHI.
4. HughesCotterell,‒SoftwareProjectManagement**‖**,2e,TMH.885.KaeronConway,
5. Software Project Management from Concept to D

**COURSE OUTCOMES:**

1. At the end of the course, the student shall be able to:
2. Understanding the specific roles within a software organization as related to project and process management
3. Understanding the basic infrastructure competences (e.g., process modeling and measurement)
4. Understanding the basic steps of project planning, project management, quality assurance, andprocess management and their relationships
5. Understanding the Flow Process and Check points of the process.
6. Understanding the Project Organizations and Responsibilities

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**OPEN ELECTIVE - II**

**(R20A0452) INTERNET OF THINGS AND ITS APPLICATIONS**

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**COURSE OBJECTIVES:**

1. To study IoT Networking Core
2. To study IoT related network fundamentals
3. To study IoT Architecture.
4. To study IoT Application Development procedure
5. To study various case studies and IoT applications.

**UNIT I**

**The IoT Networking Core:**

Technologies involved in IoT Development: Internet/Web and Networking Basics OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing IoT Platform overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

**UNIT II**

**Network Fundamentals**: Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's–Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware &Device Files interactions.

**UNIT III**

**IoT Architecture:**History of IoT, M2M–Machine to Machine, Web of Things, IoT protocols Applications: Remote Monitoring & Sensing, Remote Controlling, and Performance Analysis. The Architecture Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The 6LoW PAN Security aspects in IoT

**UNIT IV**

**IoT Application Development:** Application Protocols MQTT, REST/HTTP, CoAP, MySQL. Back-end Application Designing Apache for handling HTTP Requests, PHP & My SQL for data processing, Mongo DB Object type Database, HTML, CSS & jQuery for UI Designing, JS ON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android/IOS App Development tools

**UNIT V**

**Case Study & IoT Applications**: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment's. Use of Big Data and Visualization in IoT,Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi/ Intel Galileo/ARM Cortex/ Arduino)

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TEXT BOOKS:
1. LoWPAN:TheWirelessEmbeddedInternet,ZachShelby,CarstenBormann,Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Eco systems,Dr.Ovidiu Vermesan, Dr.Peter Friess, RiverPublishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur,   Adam   Dunkels, Morgan Kuffmann

REFERENCES:
1. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence
2. T.Yang, Huansheng Ning
3. Internet of Things (A Hands-on-Approach), Vijay Madisetti, Arshdeep Bahga
4. Designing the Internet of Things, Adrian McEwen (Author),Hakim Cassimally
5. Asoke K Talukder and Roopa R Yavagal, "MobileComputing,"Tata Mc Graw Hill,2010.
6. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
7. Computer Networks; By: Tanenbaum, AndrewS; Pearson Education Pte.Ltd., Delhi, 4thEdition
8. Data and Computer Communications; By: Stallings, William; Pearson Education Pte.Ltd., Delhi, 6thEdition

COURSEOUTCOMES:
At the end of the course, the student will be able to
1. Understand IoT Networking Core
2. Understand IoT related network fundamentals
3. Understand IoT Architecture.
4. Understand IoT Application Development procedure
5. Understand various case studies and IoT application

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**OPEN ELECTIVE - II**
**(R20A0553) OPERATING SYSTEM CONCEPTS**

COURSE OBJECTIVES:

1. To understand the basic concepts and functions of operating systems.
2. To understand Processes and Threads
3. To understand the concept of Deadlocks.
4. To analyze various memory management schemes.
5. To understand I/O management and File system
6.

## UNIT-I

**Introduction:** Concept of Operating Systems, OS Services, Structure of an Operating Systems
**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching
**Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of Multithreads.

## UNIT-II

**Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre- emptive, FCFS, SJF, RR
**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion. Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, The Producer/Consumer Problem, Semaphores, Monitors.

## UNIT-III

**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memoryallocation – Fixed and variable partition–Internal and External fragmentation;
**Paging**: Principle of operation – Page allocation – Hardware support for paging, protection and sharing, Disadvantages of paging.
**Virtual Memory**: Basics of Virtual Memory, Page fault , Demand paging;
**Page Replacement algorithms:** Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

## UNIT-IV

**File Management**: Concept of File, Access methods, File types, File operation, File System structure, Allocation methods (contiguous, linked, indexed), Directory structure, directory implementation (linear list, hash table), efficiency and performance.

## UNIT-V

**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.
**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot- block, Bad blocks.

**TEXT BOOKS:**
1. Operating SystemConcepts Essentials, 9th Edition by AviSilberschatz, PeterGalvin,Greg Gagne, Wiley Asia StudentEdition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings,Prentice Hall ofIndia.

**REFERENCE BOOKS:**
1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice- Hall ofIndia
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reillyand Associates

**COURSE OUTCOMES:**
At the end of the course the students are able to:
1. Create processes and threads.
2. Implement algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. Analyze various disk scheduling schemes

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**(R20A6681) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING LABORATORY**

**Lab Objectives**

1. Familiarity with the Prolog programming environment & Systematic introduction to Prolog programming constructs
2. Learning basic concepts of Prolog through illustrative examples and small exercises & Understanding list data structure in Prolog.
3. To introduce students to the basic concepts and techniques of Machine Learning.
4. To become familiar with regression methods, classification methods, clustering methods.
5. To become familiar with Dimensionality reduction Techniques.

**Study of PROLOG; Write the following programs using PROLOG**

**Week 1:** Implementation of DFS for water jug problem using PROLOG

**Week 2:** Implementation of BFS for tic-tac-toe problem using PROLOG

**Week 3:** Solve 8-puzzle problem using best first search

**Week 4:** Write a program to solve 8 queens problem

**Week 5:** Implementation of TSP using heuristic approach using Prolog

**Week 6:** Implementation of Simulated Annealing Algorithm using PROLOG

**Week 7:** Implementation of Hill-climbing to solve 8- Puzzle Problem

**Machine Learning Laboratory**

**Week-1**
**Data Extraction, Wrangling**
1. Loading different types of dataset in Python
2. Arranging the data

**Week-2**

**Data Visualization**
1. Handling missing values
2. Plotting the graphs

**Week-3**
**Supervised Learning**
1. Implementation of Linear Regression
2. Implementation of Logistic regression

**Week-4**
**Supervised Learning**
1. Implementation of Decision tree classification
2. Implementation of K-nearest Neighbor

**Week-5**
**Supervised Learning**
1. Implementation of Naïve Bayes classifier algorithm
2. Implementation of SVM Classification

**Week-6**
**Dimensionality Reduction**
1. Implementation of PCA
2. Implementation of LDA

**Week-7**
**Unsupervised Learning**
1. Implementing K-means Clustering
2. Implementing Hierarchical Clustering

**Lab Outcomes**
1. Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)
2. Understand the fundamentals of knowledge representation, inference and theorem proving using AI tools
3. Gain knowledge about basic concepts of Machine Learning
4. Identify machine learning techniques suitable for a given problem & Solve the problems using various machine learning techniques
5. Apply Dimensionality reduction techniques
6. Design application using machine learning techniques.

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| **(R20A0587) COMPILER DESIGN AND CASE TOOLS LAB** |
|---|

**COURSE OBJECTIVES:**

1. To provide an understanding of the language translation peculiarities

2. Writing C Programs for the implementation of FSMs

3. Designing the components of a translator(compiler) for the given(mini)language.

4. Provides knowledge of LEX tools.

5. Knowledge of Yacc tools in compiler component constructions and to draw the UML diagrams.

**Source Language ( A Case Study) :**

Consider the following mini language, a simple procedural High Level Language, operating on integer data with a syntax looking vaguely like a simple C crossed with Pascal. The syntax of the language is defined by the following BNF grammar:

<program> ::= <block>

<block> ::= { <variable definition><slist> }

| { <slist> }

<variable definition> ::= int <vardeflist> ;

<vardeflist> ::= <vardec> | <vardec>, <vardeflist>

<vardec> ::= <identifier> | <identifier> [<constant>]

<slist> ::= <statement> |<statement> ; <slist>

<statement> ::= <assignment> | <ifstatement> | <whilestatement> | <block>

| <printstatement> | <empty>

<assignment> ::= < identifier> = <expression>

| <identifier> [<expression>] = [<expression>

<ifstatement> ::= if <bexpression> then <slist> else <slist> endif

| if <bexpression> then <slist> endif

<whilestatement> ::= while <bexpression> do <slist>enddo

<printstatement> ::= print{ <expression> }

<expression> ::= <expression><addingop><term> | <term> | <addingop><term>

<bexpression> ::= <expression><relop><expression>

<relop> ::= < | <= | = = | >= | > |!=

<addingop> ::= + | -

<term> ::= <term><multop><factor> | <factor>

<multop> ::= * | /

<factor> ::= <constant> | <identifier> |<identifier> [<expression>]

| (<expression>)

<constant> ::= <digit> | <digit><constant>

<identifier> ::= <identifier><letterordigit> | <letter>

<letterordigit> ::= a|b|c|….|y|z

<digit> ::= 0|1|2|3|…|8|9

<empty> ::= has the obvious meaning

Comments : zero or more characters enclosed between the standard C/Java style comment brockets /*…*/. The language has the rudimentary support for 1-Dimensional arrays. Ex: int a[3] declares a as an array of 3elements, referenced as a[0],a[1],a[2].

Sample Program written in this language is :
{ int [3],t1,t2; t1=2;
a[0]=1; a[1]=2; a[t1]=3;
t2= -(a[2]+t1*6) / a[2]-t1);
if     t2>5      then
print(t2);else
{
int  t3;  t3=99;
t2=25;}
print(11+t2*t3); /* this is not a comment on two
lines */
}
endif
}    //    End    of    the
program(block)

**WEEK1.** Write a C Program to Scan and Count the number of characters, words, and lines in afile.

**WEEK2.** Write a C Program to implement NFAs that recognize identifiers, constants, and operators of the Mini language.

**WEEK3.**Write a C Program to implement DFAs that recognize identifiers, constants, and operators of the mini language.

**WEEK4.** Design a Lexical analyzer for the above language. {Note-The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.}

**WEEK5.** Implement the lexical analyzer using JLex, flex, flex or lex or other lexical analyzer generation tools.

**WEEK6.** Design Predictive parser for the given language.

**WEEK7.** Design LALR bottom up parser for the above language using tools or C

**WEEK8.** Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.

**WEEK9.** Write program to generate machine code from the abstract syntax tree generated by the parser.

**Following instruction set may be considered as targetcode.**

The following is a simple register-based machine, supporting a total of 17 instructions. It has three distinct internal storage areas. The first is the set of 8 registers, used by the individual instructions as detailed below, the second is an area used for the storage of variables and the third is an area used for the storage of program. The instructions can be preceded by a label. This consists of an integer in the range 1 to 9999 and the label is followed by a colon to separate it from the rest of the instruction. The numerical label can be used as the argument to a jump instruction, as detailed below.

In the description of the individual instructions below, instruction argument types are specified as follows:

R specifies a register in the form R0, R1, R2, R3, R4, R5, R6 or R7 (or r0, r1, etc). L specifies a numerical label (in the range 1 to 9999).
V specifies a "variable location" (a variable number, or a variable location pointed to by a register - see below).

A specifies a constant value, a variable location, a register or a variable location pointed to by a register (an indirect address). Constant values are specified as an integer value, optionally preceded by a minus sign, preceded by a # symbol. An indirect address is specified by an @ followed by a register.

So, for example an A-type argument could have the form 4 (variable number 4), #4 (the constant value 4), r4 (register4) or @r4 (the contents of register 4 identifies the variable location to be accessed).

The instruction set is defined as follows:
LOADA, R
loads the integer value specified by A into register R.
STORER, V
stores the value in register R to variable V.
OUTR

outputs the value in register R.NEG R
negates the value in register R.ADD A, R
adds the value specified by A to register R, leaving the result in register R. SUB A, R subtracts the value specified by A from register R, leaving the result in register R. MUL A, Rmultiplies the value specified by A by register R, leaving the result in register R. DIV A, R divides register R by the value specified by A, leaving the result in register R. JMP L
causes an unconditional jump to the instruction with the label L. JEQ R, L
jumps to the instruction with the label L if the value in register R is zero. JNE R, L jumps to the instruction with the label L if the value in register R is notzero. JGE R, L jumps to the instruction with the label L if the value in register R is greater than or equal tozero. JGT R, L jumps to the instruction with the label L if the value in register R is greater thanzero. JLE R,L
jumps to the instruction with the label L if the value in register R is less than or equal tozero. JLT R,Ljumps to the instruction with the label L if the value in register R is less than zero. NOP is an instruction with no effect. It can be tagged by a label. STOPstops execution of the machine.
All programs should terminate by executing a STOP instruction.

**WEEK 10:**
UML Diagram for ATM Transaction System

**WEEK 11:**
UML Diagram for Library Management System

**WEEK 12:**
UML Diagram for College Administration System

**COURSE OUTCOMES:**
By the end of the semester, students will be able to
1.      Understand the practical aspects, and approaches of how a compiler works and UML diagrams.
2. Implement Finite state machines in C to recognize various tokens of C language
3. Apply the techniques used in Compiler Construction
4. Construct few phases of the compiler for the mini language using Lex and Yacc tools
5. Optimize the functionality of a compiler

**RECOMMENDED SYSTEM / SOFTWARE REQUIREMENTS:**
1.        Intel based desktop PC with minimum of 166MHz or faster processor with at least 64 MB RAM and 100 MB free diskspace.
2. C ++ Compiler and JDK kit, Lex or Flex and YACC tools ( Unix/Linux utilities)


**USEFUL TEXT BOOKS / REFERECES / WEBSITES:**
1.        Modern compiler implementation in C, Andrew w.Appel, Revised Edn, Cambridge UniversityPress
2. Principles of Compiler Design. – A.V Aho, J.D Ullman ; PearsonEducation.
3. lex&yacc , -John R Levine, Tony Mason, Doug Brown;O'reilly.
4. Compiler Construction,- LOUDEN, Thomson.
5. Engineering a compiler – Cooper& Linda,Elsevier
6. Modern Compiler Design – Dick Grune,Henry E.Bal, Cariel TH Jacobs, WileyDreamtech

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| (R20A0006) TECHNICAL COMMUNICATION AND SOFT SKILLS |
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**INTRODUCTION:**

'Technical Communication and Soft skills'focus on enhancing students' communication skills. Various technical writing styles and skills are developed. Students' placementneeds met by giving them an exposure to group discussions and mock interviews. Soft skills such as building positive relationships and teamwork are also emphasized.

The trainee hones these skills under the guidance ofthe instructor whose constant evaluation helps in the professional development of students. This course fulfils the need of the aspirants in acquiring and refining the skills required for placements and professional success.

**COURSE OBJECTIVES:**

1. To make the students recognize the role of technical English in their academic and professional fields
2. To improve language proficiency and to develop the required professional ethics
3. To equipstudents, organize, comprehend, write, and present, short and long forms of any technical work within the broad framework of the Scientific Method
4. To facilitate communication about projects and ideas throughout the industry and also to the non-technical people
5. To display professional behaviors and body language

**UNIT I** – **Effective Presentations**
Just-a-Minute sessions, Formal versus informal communication, Non-verbal communication; Concord**:**Subject-verb agreement
**UNIT 2** - **Professional Communication**
Role Plays, Persuasion techniques, Presentation aids, Body language, Importance of listening in effective communication; Email Writing, Business Letter Writing, Letters of complaint, enquiry, responses; Memo Writing; Transformation of Sentences
**UNIT 3** – **Career Planning**
Oral Presentations, Techniques of Listening Skills, types of Group discussions; Etiquette, Protocol; Resume Writing, Cover letter, Writing a statement of purpose; Tenses
**UNIT 4** - **Technical Writing**
Group Discussion, Principles of Effective Writing; Paragraph writing, Advanced Essay Writing, Expansion for or against the essay, Narrative essay, Descriptive essay; Technical Report Writing, Format &Style; Active & Passive Voice
**UNIT 5** – **Academic Writing**
Mock Interview sessions, facing interviews; Correction of Sentences

**REFERENCE BOOKS:**

1. R.K. Narayan, The Guide, Viking Press, 1958
2. David F. Beer and David Mc Murrey, Guide to writing as an Engineer, John Willey. New York, 2004
3. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
4. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
5. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
6. Meenakshi Raman, Prakash Singh, Business communication, Oxford Publication, New Delhi 2012.
7. Dale Jung k, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
8. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
9. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

**COURSE OUTCOMES:**

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

1. Understand information which assists in completion of the assigned job tasks more successfully.
2. Communicate his ideas by writing projects, reports, instructions, diagrams and many other forms of professional writing.
3. Adhere to ethical norms of scientific communication.
4. Strengthen their individual and collaborative work strategies.
5. Successfully market themselves and sell themselves to the employer of their choice.

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| (R20A0526) NEURAL NETWORKS |
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**COURSE OBJECTIVES:**

1. To understand the concepts of Artificial Neuron and its architecture.

2. Student will able to implement MLP with Back Propagation Methods

3. Student can able to understand fuzzy logic and its properties.

4. Student can able to implement fuzzy controllers

5. Student will be exposed to genetic algorithm procedures and implementation.

**UNIT-1**

Neural Networks-I (Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.

Various learning techniques: perception, convergence rule, and Auto-associative,hetro-associative memory.

**UNIT-2**

Neural Networks-II (Back propagation networks): Architecture: Perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications.

**UNIT-3**

Fuzzy Logic-I (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

**UNIT-4**

Fuzzy Logic –II (Fuzzy Membership, Rules) : Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications

**UNIT-5**

Genetic Algorithm(GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

**TEXT BOOKS:**

1.        S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.

2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press. Reference Books:

3. Siman Haykin,"Neural Netowrks"Prentice Hall of India

4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

**COURSE OUTCOMES:**

1. Student can Implement artificial neuron with different architectures
2. Student can able to develop a neural network system with back propagation
3. Student can able to implement fuzzy to crisp conversion
4. Student can able to apply fuzzy logic in various applications
5. Student can able to apply genetic algorithm in various applications

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### (R20A0533) DATA WAREHOUSING AND DATA MINING

**COURSE OBJECTIVES:**

1. Study data warehouse principles

2. Study and its working learn data mining concepts

3. Understand association rules mining.

4. Discuss classification algorithms

5. learn how data is grouped using clustering techniques.

**UNIT-I**

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

**UNIT-II**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining.
Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration &Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT-III**

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**UNIT-IV**

Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

**UNIT-V**

Clustering: Clustering Overview, A Categorization of Major Clustering Methods,
Partitioning Methods, Hierarchical Methods, , Partitioning Clustering-K-Means Algorithm, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm,  Key Issues in Hierarchical Clustering, Strengths and Weakness,Outlier Detection.

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**TEXT BOOKS:**

1. Data Mining- Concepts and -1.chniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Psng-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Educatior.

**REFERENCE BOOKS:**

1. Data Mining Techniques, Arun KPujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundament's, Pualraj Ponnaiah, Wiley Student Edition.
3. The Data Warehouse Life CycleToolkit — Ralph Kimball, Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Rddha Krishna, Oxford University Press

**OUTCOMES:**

1. Student should be able to understand why the data warehouse in addition to database systems.
2. Ability to perform the pre-processing of data and apply mining techniques on it.
3. Ability to identify the association rules,
4. Ability to identify classification techniques.
5. Ability to identify  clusters in large data sets.

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| (R20A0517) FULL STACK WEB DEVELOPMENT |
|---|

**COURSE OBJECTIVES:**

1. To learn the core concepts of both the frontend and backend programming course.

2. To get familiar with the latest web development technologies.

3. To learn all about databases.

4. To learn complete web development process

5. To provide an in-depth study of the various web development tools

**UNIT - I:**

Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git & Github HTML, CSS

**UNIT - II:**

Frontend Development: Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.

**UNIT - III:**

REACT JS: Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

**UNIT- IV:**

Java Web Development:JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application using Maven

**UNIT - V:**

Databases & Deployment:Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud

**TEXT BOOKS:**
1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon
3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BY AZAT MARDAN

**REFERENCE BOOKS:**
1. Full-Stack JavaScript Development by Eric Bush.
2. Mastering Full Stack React Web Development Paperback – April 28, 2017 by TomaszDyl , Kamil Przeorski , Maciej Czarnecki

**COURSE OUTCOMES:**
1. Develop a fully functioning website and deploy on a web server.
2. Gain Knowledge about the front end and back end Tools
3. Find and use code packages based on their documentation to produce working results in a project.
4. Create webpages that function using external data.
5. Gain an understanding about the databases.

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| (R20AM503) GAME PROGRAMMING |
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**(PROFESSIONALELECTIVE-II)**

## OBJECTIVE

1. To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design.

2. Game engine development, modeling, techniques, handling situations, and logic.

3. At the end, the student will be in a position to create interactive games.

4. To learn this course an exposure to 3D graphics principles and animation techniques are the prerequisite.

5. The student can develop games in different environments.

## UNIT-I   3D GRAPHICS FORGAME PROGRAMMING

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization,FragmentProcessingandOutputMerging,IlluminationandShaders,Parametric CurvesandSurfaces,ShaderModels,ImageTexturing,BumpMapping,AdvancedTexturing, Character Animation, Physics-based Simulation

## UNIT-II  GAMEDESIGNPRINCIPLES

Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection, GameLogic, GameAI, Path Finding

## UNIT-III GAMINGENGINE DESIGN

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics

## UNIT-IV GAMING PLATFORMSANDFRAMEWORKS

Flash,DirectX,OpenGL,-Java,-Python,-XNA-with-Visual-Studio,-Mobile-Gaming-for-the-Android, iOS, Game engines - Adventure Game Studio, DXStudio,-Unity

## UNIT-V GAMEDEVELOPMENT

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

**TEXT BOOKS:**

1.      David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2 Edition,2006.

2.      ungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1st edition,2011.

3.      Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media,2009.

4.      Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition,2009.

**REFERENCES:**

1.   Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st edition,2006.

2.   Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009.

3.   Scott Rogers, "Level Up!: The Guide to Great Video Game Design", Wiley, 1stedition, 2010.

4.   Jason Gregory, "Game Engine Architecture", A K Peters,2009.

5.   Jeannie Novak, "Game Development Essentials", 3rd Edition, Delmar Cengage Learning,2011.

**COURSE OUTCOMES:**

1. Solve complex logic problems using the tools and techniques found in computer science, software engineering, and game programming.
2. Write clear and efficient code in the programming languages relevant to professional game development, following appropriate coding standards and industry practices.
3. Build systems that employ common approaches to game AI, game physics, game networking, game graphics (2-D and 3-D), operating systems, and file formats.
4. Solve complex software architectural design problems found in multi-platform, multi-user, and/or multi-component.
5. They  can design  different games on different platforms according to client requirements.

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### (R20A6202) CYBER SECURITY

**COURSE OBJECTIVES:**

1. To familiarize various types of cyber-attacks and cyber-crimes
2. To give an overview of the cyber laws
3. To study the defensive techniques against these attacks
4. To study cyber security challenges and implications.
5. To know about Cyber Security.

**UNIT - I:**
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

**UNIT - II:**
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

**UNIT - III:**Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

**UNIT - IV:**
Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

**UNIT - V:**

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain

**TEXT BOOKS***:*

1.   Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2.   B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm,
Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

**REFERENCE BOOKS:**
1.   Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2.   Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

**COURSE OUTCOMES:**

Student will be able to

1.   Understand basic concepts ofCyber Crimes.
2.   Ability to identify the attacks in CyberCrimes
3.   Able to specify the suitable methods used in CyberCrime
4.   Ability to face cyber securitychallenges
5.   Understand Cyber laws

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# (R20A6604) COMPUTER VISION
## (PROFESSIONAL ELECTIVE-II)

**COURSE OBJECTIVES**

1. To introduce various components of image processing techniques for computer vision.
2. To understand filters and computing Image Gradient.
3. To understand segmentation, model fitting and tracking
4. To impart knowledge about object registration and object matching
5. To implement various techniques available for object recognition.

**UNIT-I**
**IMAGE FORMATION**: Geometric Camera Models, Intrinsic and Extrinsic Parameters, Geometric Camera Calibration – Linear and Non – linear approach, Light and Shading - Inference from, Modeling Inter reflection, Human Color Perception.

**UNIT-II**
**EARLY VISION:** Linear Filters - Convolution, Fourier Transforms, Sampling and Aliasing, Filters as Templates, Correlation, Local Image Features -  Computing the Image Gradient, Gradient-Based Edge Detectors, Orientations, Texture - Local Texture Representations Using Filters, Shape from Texture.

**UNIT-III**
**MID-LEVEL VISION**: Segmentation by Clustering - Basic Clustering Methods, The Watershed Algorithm, Segmentation Using K-means, Grouping and Model Fitting - Fitting Lines with the Hough Transform, Fitting Curved Structures, Tracking - Tracking by Detection, Tracking Translations by Matching, Tracking Linear Dynamical Models with Kalman Filters.

**UNIT-IV**
**HIGH-LEVEL VISION:** Registration, Registering Rigid and Deformable Objects, Smooth Surfaces and Their Outlines - Contour Geometry, Koenderink's Theorem, The Bitangent Ray Manifold, Object Matching using Interpretation Trees and Spin Images, Classification, Error, and Loss.

**UNIT-V**
**OBJECT DETECTION AND RECOGNITION:**Detecting Objects in Images - The Sliding Window Method, Face Detection, Detecting Humans, Boundaries and Deformable Objects, Object Recognition – Categorization, Selection, Applications – Tracking People, Activity Recognition.

**TEXT BOOKS:**

1. Forsyth, Jean Ponce David A. "Computer Vision: A Modern Approach", Second Edition, PearsonEducation Limited 2015.
2. Szeliski, Richard, "Computer vision: algorithms and applications", Springer Science & BusinessMedia, 2010.

**REFERENCE BOOKS:**

1. Hau, Chen Chi, "Handbook of pattern recognition and computer vision", World Scientific, Fifth Edition, 2015.
2. Muhammad Sarfraz, "Computer Vision and Image Processing in Intelligent Systems and MultimediaTechnologies", IGI Global, 2014.
3. Theo Gevers, ArjanGijsenij, Joost van de Weijer, Jan-Mark Geusebroek "Color in Computer Vision: Fundamentals and Applications", Wiley, 2012.
4. Kale, K. V, Mehrotra S.C, Manza. R.R., "Advances in Computer Vision and Information Technology", IK International Pvt Ltd, 2013.

**COURSE OUTCOMES:**

1. Understand various image formation models.

2. Extract shape, texture and edge based features.

3. Detect region of interest using image segmentation and object localization techniques.

4. Identify and recognize objects using image registration and classification.

5. Explore various case studies on vision based applications.

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**OPEN ELECTIVE - II**
**(R20A0453) ROBOTICS AND AUTOMATION**

**COURSE OBJECTIVES:**

1.       To study overview of Embedded Systems, Robots, Microprocessors &Microcontrollers.
2.       To study in detail about Robotics and sensors.
3.       To study about AVR RISC Microcontroller architecture in detail.
4.       To study about ARM Processor in detail.
5.       To study about Artificial Intelligence in Robotics.

**UNIT -I**
Introduction to Embedded System Design, Categories of ES, Overview of Embedded System Architecture, Recent Trends in Embedded Systems, Hardware Architecture of Embedded System, Real-time Embedded Systems and Robots, Robots and Robotics, Microprocessors and Microcontrollers, Microcontroller or Embedded Controller

**UNIT - II**
**Robotics:** Classification of Robots, Degree of freedom, Kinematics; Multidisciplinary approach: Motors-DC motors, Stepper Motors, Servo Motors; Power Transmission-Type of Gears, Gear Assembly, CAM follower, Sensors, Open loop and Closed-loop Controls, Artificial Intelligence.

**UNIT- III**

**The AVR RISC microcontroller architecture:** Introduction , AVR family architecture, register file, the ALU, memory access and instruction execution, I/O memory ,EEPROM ,I/O ports, timers, UART, Interrupt structure.

**UNIT-IV**
**ARM Processor:** Fundamentals, Registers, current program status register, pipeline concept, Interrupt and the vector table.

**UNIT V**
**AI IN ROBOTICS**: Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

**TEXT BOOKS:**

1.    Subrata Ghoshal, "Embedded Systems & Robots", CengageLearning
2.    Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approch", PearsonEducation,India2003.
3.    ARM System Developer's Guide: Designing and Optimizing System Software- AndrewN.
4.    Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

**REFERENCE BOOKS:**

1.       M.A. Mazidi, J.G. Mazidi, R.D. Mckinlay, "8051 Microcontroller and EmbeddedSystems", Pearson.

2.       Dr.K.V.K.Prasad,"Embedded/Real-TimeSystems:ConceptsDesign&Programming", Dreamtech

3.       Microcontrollers and applications, Ajay V Deshmukh ,TMGH,2005

**COURSE OUTCOMES:**

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

1. Understand the overview of Embedded Systems, Robots, Microprocessors&Microcontrollers.
2. Understand in detail about Robotics and sensors.
3. Understand AVR RISC Microcontroller architecture indetail.
4. Understand about ARM Processor indetail.
5. Understand about Artificial Intelligence in Robotics.

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## OPEN ELECTIVE - III
## (R20A1254) BIG DATA ARCHITECTURE

**COURSE OBJECTIVES**

1.     To introduce the terminology, technology and its applications
2.     To introduce the concept of Analytics and Visualization
3.     To demonstrate the Big Data Architecture and its components, tools
4.     To introduce Apache Spark
5.     To introduce Technology Landscape using NoSQL

### UNIT I
**Big Data Introduction:** Classification of Digital Data, Structured and Unstructured Data, Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data , Why Big Data - Traditional Business Intelligence versus Big Data, Importance of Big Data.

### UNIT II:
**Big Data Architecture Introduction:** Big Data Architecture- Definition, Why Big Data Architecture. Evolution of Big Data Architecture, Market Trends, Big Data Architecture and Its Sources, Big Data Architecture Use Cases.

### UNIT-III
**Big Data architecture components:** Data ingestion, Data storage, Data Computing, Data Analysis, Data Visualization. Understanding the Lambda architecture, HBase, Spark Libraries, Spark Streaming.

### UNIT IV
**Introducing Apache Spark :** IntroductiontoSpark, Spark Architecture and its components, Features of Spark, Spark vs Hadoop, Challenges of Spark.

### UNIT V
**Introduction to Technology Landscape**
NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

**TEXT BOOKS:**
1.     Tom White — Hadoop: The Definitive Guide‖ Third Edit on, O'reily Media,2012.
2.     Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley2015.

**REFERENCE BOOKS:**
1.     Michael Berthold, David J. Hand, "Intelligent Data Analysis‖, Springer,2007.
2.     JayLiebowitz,‒BigDataandBusinessAnalytics‖AuerbachPublications,CRC press(2013)
3.     TomPlunkett,MarkHornick,‒UsingRtoUnlocktheValueofBigData:BigDataAnalytics  with  Oracle  R Enterprise and Oracle R Connector for Hadoop‖, McGraw-Hill/Osborne Media (2013), Oraclepress.
4.     Glen J.Myat,‒MakingSenseofData‖,JohnWiley&Sons,2007
5.     PeteWarden,‒BigDataGlossary‖,O'Reily,2011.
6.     Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging

Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications,2013.

7.  ArvindSathi,‒BigDataAnalytics:DisruptiveTechnologiesforChangingtheGame**||**,MCPress, 2012

8.  Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications

**COURSE OUTCOMES**:
Upon successful completion of the course, the student is able to

1.  Identify Big Data and its BusinessImplications.
2.  Categorize and summarize Big Data and itsimportance.

3.  Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big dataanalytics

4.  Compare various file systems and use an appropriate file system for storing different types of data.

5.  Connect to web data sources for data gathering, Integrate data sources with Hadoop components to process streamingdata.

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# OPEN ELECTIVE – III
## (R20A0554) INFORMATION SECURITY

**COURSE OBJECTIVES:**
1. To learn the objectives of information security, importance and application of confidentiality, integrity, authentication and availability
2. To understand various cryptographic algorithms and basic categories of threats to computers and networks
3. To describe public-key cryptosystem, enhancements made to IPv4 by IPSec To understand Intrusions and intrusion detection.
4. To gain knowledge on fundamental ideas of public-key cryptography.
5. To generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
6. To understand the importance and implementation of Web security and Firewalls

**UNIT - I:**
**Attacks on Computers and Computer Security:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security
**Cryptography: Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

**UNIT - II:**
**Symmetric key Ciphers:** Block Cipher principles & Algorithms(DES, AES), Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution
**Asymmetric key Ciphers:** Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman), Key Distribution.

**UNIT - III:**
**Message Authentication Algorithms and Hash Functions:** Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, Digital signatures, **Authentication Applications:** Kerberos, X.509 Authentication Service, Public — Key Infrastructure, Biometric Authentication

**UNIT - IV:**
**E-Mail Security:** Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management

**UNIT - V:**
**Web Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction **Intruders, Virus and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls **Case Studies on Cryptography and security:** Secure **Inter-branch** Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

**TEXT BOOKS:**
1. Cryptography and Network Security : William Stallings, Pearson Education,4[11]i Edition

2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2" Edition

**REFERENCE  BOOKS:**
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, lst Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2"d Edition Information Security, Principles and Practice: Mark Stamp, Wiley India.
3. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH
4. 4. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
5. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

**COURSE OUTCOMES:**
1. Student will be able to understand basic cryptographic algorithms, message and webauthentication and security issues.
2. Ability to identify information system requirements for both of them such as client andserver.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms tocounter them.
4. Ability to understand the current legal issues towards information security.
5.  Understand the importance of Web security and Firewalls

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### OPEN ELECTIVE – III
### (R20A0555)  CLOUD COMPUTING FUNDAMENTALS

**COURSE OBJECTIVES:**

To understand the various distributed system models and evolving computing paradigms

To gain knowledge in virtualization of computerresources To realize the reasons for migrating intocloud

To introduce the various levels of services that can be achieved by acloud. To describe the security aspects in cloud and the services offered by acloud.

**UNIT- I:**

**Systems Modeling** :**Distributed System Models and Enabling Technologies**- Scalable Computing over the Internet- System Models for Distributed and Cloud Computing- Software Environments for Distributed Systems and Clouds- Performance, Security, and Energy Efficiency

**UNIT- II:**

**Virtualization: Virtual Machines and Virtualization of Clusters and data centers**-Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms-Virtualization of CPU, Memory, and I/O Devices-Virtual Clusters and data centers

**UNIT- III:**

**Foundations:** Introduction to Cloud Computing- Migrating into a Cloud-The Enterprise Cloud Computing Paradigm.

**UNIT- IV:**

**Infrastructure as a Service (IAAS) & Platform (PAAS):** Virtual machines provisioning and Migration services-On the Management of Virtual machines for Cloud Infrastructures-Aneka—Integration of Private and Public Clouds

**UNIT- V:**

**Software as a Service ( SAAS) &Data Security in the Cloud:**
Google App Engine – Centralizing Email Communications- Collaborating via Web-Based Communication Tools-An Introduction to the idea of Data Security- The Current State of Data Security in the Cloud- Cloud Computing and Data Security Risk- Cloud Computing and Identity.

**TEXT BOOKS:**

Distributed and Cloud Computing, Kaittwang Geoffrey C.Fox and Jack J Dongrra, Elsevier India 2012.

Mastering Cloud Computing- Raj Kumar Buyya, Christian Vecchiola and S.TanuraiSelvi, TMH, 2012.

Michael Miller, Cloud Computing: Web-Based Applications That Change the Wayyou Work and Collaborate Online, Que Publishing, August 2008.

**COURSE OUTCOMES:**

To distinguish the different models and computing paradigms.

To explain the levels of virtualization and resources virtualizationTo analyze the reasons for migrating into cloud

To effectively use the cloud services in terms of infrastructure and operating platforms.

To apply the services in the cloud for real world scenarios

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**DEV-OPS**
**OPEN ELECTIVE – III (R20A01255)**

**COURSE OBJECTIVES:**
To learn
1. To introduce the terminology, technology and its applications
2. To introduce the concept of Automation and understanding the code quality
3. To demonstrate source code management tools
4. To demonstrate the usage of Continuous delivery and deployment management
5. To demonstrate continuous delivery and deployment
6. To demonstrate AWS and AZURE cloud

**UNIT-I:**
**INTRODUCTION TO DEVOPS:** Introduction, DevOps Features, Work Management, Source Code Management, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/CD.

**UNIT-II:**
**SOURCE CODE MANAGEMENT (GIT):** Version controlling with SVN and GIT, Branching Workflows in SVN & GitHub Flow. **BUILD AUTOMATION** – CI: Build ( CI ) Orchestration using Jenkins Automation Server, Pipeline Basics – Jenkins Master, Node, Agent and Executor.

**UNIT-III:**
**AUTOMATION SERVER**: JENKINS – Continuous Integration and Delivery server JENKINS – CD Orchestrator. **UNIT TESTING** – CODE COVERAGE: jUnit, nUnit & Code Coverage with Sonar Qube, SonarQube – Code Quality Analysis.**ARTIFACT MANAGEMENT:** Nexus, JFrog Artifactory, JFrog Artifactory as Kubernetis Registry, Helm chart for Microsoft Azure Pipeline.

**UNIT-IV:**
**CONTINUOUS DELIVERY:** Software components can be released in short cycles, CONTINUOUS DEPLOYMENT: Extends Continuous Delivery, Change is automatically deployed to Production, CD Flow. **Continuous Deployment:** Containerization with Docker: Introduction to Docker, Images & Containers, DockerFile.

**UNIT-V:**
**Continuous Deployment:** Configuration Management – Ansible: Introduction to Ansible, Ansible tasks, Roles, Jinja templates, Vaults, Deployments using Ansible. **CONTAINERIZATION USING KUBERNETES(OPENSHIFT):** Introduction to Kubernetes Namespace & Resources.
**AWS & AZURE – CLOUD:** Introduction to AWS & Azure Clouds, Pipeline of AWS & Azure Clouds – CI/CD.

**TEXT BOOKS:**
1.      Version Control with Subversion -O'Reilly Media; Second edition
2.      Version Control with Git -O'Reilly Media; Second edition
3.      The DevOps Handbook:: How to Create World-Class Agility, Reliability, and Gene Kim, Jez Humble,Patrick Debois, John Willis
4.      Practical DevOps By Joakim Verona
5.      Jenkins: The Definitive Guide by John Ferguson Smart  -O'Reilly Media 2011

**REFERENCE BOOKS:**
1.      DevOps for Developers By Michael Huttermann

**COURSE OUTCOMES:**

Upon successful completion of the course, the student is able to

1. Compare various source code management tools and use with Jenkins Automation servers.

2. Demonstrate the concepts of GIT hub and SVN workflows.

3. Elaborate Jenkins Automation server in the development of various application area.

4. Apply the knowledge of programming to process the Automation process.

5. Connect to AWS and AZURE cloud to integrate the various platforms

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**(R20A0589) FULL STACK DEVELOPMENT LAB**

**COURSE OBJECTIVES:**
1. Systematic Introduction to Web Designing
2. Getting familiar with the front and back end tools
3. Creating applications using HTML,CSS,Javascript
4. Implementing various applications using JQuery
5. Creating Websites

**Week-1**. Write a program to create a simple webpage using HTML.

**Week-2**. Write a program to create a website using HTML CSS and JavaScript?

**Week-3**. Write a program to build a Chat module using HTML CSS and JavaScript?

**Week-4**. Write a program to create a simple calculator Application using React JS

**Week-5**. Write a program to create a voting application using React JS

**Week-6**. Write a program to create and Build a Password Strength Check using Jquery.

**Week-7**. Write a program to create and Build a star rating system using Jquery.

Week-8.Create a project on **Project Management application**

This is going to be the toughest of all with a lot of features. They should have a framework of a basic social media site with users being able to communicate with each other. Users should be able to create projects and tasks within projects.

Users must be able to assign tasks to other users and must be able to comment on it just like on a social media post. To start with, each user can have a calendar view and a kanban style board. Users must be able to close and archive tasks as well as projects when completed.

**Week-9**.Create a project on Content Management System for a blog
Using the CMS users must be able to design a web page using the drag and drop method. Users should be able to add textual or media content into placeholders that are attached to locations on the web page using drag and drop method.

**Week-10.**Create a project on  **Grocery delivery application**

Assume this project is for a huge online departmental store. Assume that they have a myriad of grocery items at their godown. All items must be listed on the website, along with their quantities and prices.

Users must be able to sign up and purchase groceries. The system should present him with delivery slot options, and the user must be able to choose his preferred slot. Users must then be taken to the payment page where he makes the payment with his favourite method.

**Week-11.***Create a project* **e-commerce portal for used furniture sales**

Assume this project is for a startup that is acquiring used furniture from users at a price, refurbishing them and selling them off at a margin. The website must display  second-hand furniture that is currently being sold.

Users must be able to sign up on the site and set up their profile. Users must be able to search for their required products and checkout to the payment page. Once payment is successful, the expected time of product arrival must be communicated to the user via email as well as displayed on the order page.

Users must also be able to sell used furniture to the company. Users must be able to upload pictures of the items they intend to sell. Based on the images, company admins must be able to decide whether to buy or not.

**COURSE OBJECTIVES:**
Students will be able to understand
1. Usage of various front and back end Tools

2. They can understand and create applications on their own

3. Demonstrate and Designing of Websites can be carried out.

4. Hands on experience on Databases.

5. Capable of working on both front and back end Tools

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### (R20A1282) DATA WARE HOUSING AND DATA MINING LAB

**COURSE OBJECTIVES:**

1. Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics)
2. Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA), Understandthe data sets and data preprocessing
3. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification,clustering and regression,
4. Exercise the data mining techniques with varied input values for different parameters.

**LIST OF EXPERIMENTS**: -

Experiments using Weka & Clementine Tool

**WEEK 1:** Data Processing Techniques:

(i)Data cleaning (ii) Data transformation - Normalization

(iii)Dataintegration **WEEK 2:** Data Warehouse schemas – star, snowflake,fact constellation **WEEK 3:** Data cube construction –OLAP operations

**WEEK 4:** Data Extraction, Transformations &Loading operations

**WEEK 5:** Implementation of Attribute oriented induction algorithm**WEEK 6:** Implementation of apriori algorithm

**WEEK 7:** Implementation of FP –Growth algorithm

**WEEK 8:** Implementation of Decision Tree Induction **WEEK 9:** Calculating Information gain measures

**WEEK 10:** Classification of data using Bayesian approach

**WEEK 11:** Classification of data using K – nearest neighbor approach

**WEEK 12:** Implementation of K –means algorithm

**WEEK 13:** Implementation of PAM algorithm

**COURSE OUTCOMES:**
- Ability to add mining algorithms as a component to theexisting tools
- Ability to apply mining techniques forrealistic data.

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### (R20A0007) CONSTITUTION OF INDIA

**INTRODUCTION**

The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

This course "Indian Constitution" has been designed to develop understanding of the IndianConstitution among the students.

**COURSE OBJECTIVES:**

1.      To enrich the students' understanding of the constitution's origin and its power
2.      To facilitatestudents to analyze the political principles
3.      To assist the students to be aware of their fundamental rights and duties
4.      To enable learning about the federal structure Parliamentary form of government
5.      To be acquainted with the historical perspectives of the constitutional amendments

The following course content is prescribed for this course.

**UNIT –I**
Meaning of constitution law and constitutionalism
Historical perspective of the constitution of India
Salient features and characteristics of the constitution of India

**UNIT –II**
Scheme of fundamental rights
The scheme of the fundamental duties and its legal status
The Directive Principles of State Policy-its importance and implementation

**UNIT–III**
Federal structure and distribution of legislative and financial powers between the Union and theStates, Parliamentary Form of Government in India-the constitution powers and status of the
president of India, Amendment of the Constitutional Powers and Procedure

**UNIT –IV**
The historical perspectives of the constitutional amendments in India., Emergency provisions: National Emergency, President Rule, Financial Emergency, Local self government-Constitutional

scheme in India
**UNIT –V**
Scheme of fundamental Right to quality Scheme of fundamental Right to certain Freedom under Article 19Scope of the Right to Life and Personal Liberty under Article 21

**COURSE OUTCOMES**:
After completion of the course, Students will be able to:
1. Improve their knowledge about Indian constitution
2. Value their identity and exercise their fundamental rights
3. Comprehend how differently government bodies function
4. Define their rights as voters of the country
5. Analyze the constitution and become responsible citizens

# (R20A6605) COGNITIVE COMPUTING

## COURSE OBJECTIVES:

1. Appealing new model or paradigm for application development using cognitivecomputing
2. To identify and evaluate patterns and complex relationships in large and unstructureddata sets
3. Evaluate data in context and presenting relevant findings along with the evidence that justifiestheanswers
4. To evaluate IBM's Watson question-answering technology.
5. To know how solve the case studies of cognitive computing.

### UNIT-I Foundations of Cognitive Computing

Cognitive computing as new generation, uses of cognitive systems, what makes system cognitive, Gaining insights from data, Artificial intelligence-the foundation, Understanding cognition, Understanding complex relationships, the elements of cognitive systems

### UNIT-II Design Principles of Cognitive Systems

Components of cognitive systems, Building the Corpus, Bringing data into the cognitive system, Machine learning, Hypothesis generation and scoring, Presentation and visualization services

### UNIT-III Natural Language Processing-Support of Cognitive System

The role of NLP in a cognitive system, Understanding linguistics, Phonology, morphology, lexical analysis, syntax and syntactic analysis, importance of Hidden Markov models,

Semantic Web, Applying natural language technologies to business problems, enhancing shopping experience, fraud detection

### UNIT-IV Watson as a Cognitive System

Watson defined, Advancing research with a "Grand Challenge", Preparing Watson for jeopardy, commercial applications, components of deepQA architecture, Question analysis, hypothesis generation, scoring and confidence generation

### UNIT-V CASE STUDIES: Cognitive Systems in health care – Cognitive Assistant for visually impaired –AI for cancer detection, Predictive Analytics - Text Analytics - Image Analytics -Speech Analytics – IBM Watson - Introduction to IBM's PowerAI Platform -Introduction to Google's Tensorflow Development Environment

**Text Books:**
1. Hurwitz, Kaufman, and Bowles, "Cognitive Computing and Big Data Analytics", Wiley, Indianapolis, 2005.
2. Jerome R. Busemeyer, Peter D. Bruza, "Quantum Models of Cognition and Decision", Cambridge University Press, 2014.
3. Emmanuel M. Pothos, Andy J. Wills, "Formal Approaches in Categorization", Cambridge University Press, 2011.
4. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
5. Neil Stillings, Steven E. Weisler, Christopher H. Chase and Mark H. Feinstein, "Cognitive Science: An Introduction", MITPress, 1995.

**Reference Books:**
1. Judith Hurwitz, Marcia Kaufman, Adrian Bowles, Cognitive Computing and Big Data Analytics, 1stEdition, Wiley Publisher, 2015, ISBN: 978-1-118-89662-4
2. Hurwitz, Kaufman, and Bowles, Cognitive Computing and Big Data Analytics, Wiley, Indianapolis, IN, 2005, ISBN: 978-1-118-89662-4
3. Peter Finger, Cognitive Computing: A Brief Guide for Game Changers, Meghan KifflerPress, 1st Edition, 2015, ISBN: 973-0-92965251-1
4. Kai Hwang, Cloud Computing for Machine Learning and Cognitive Applications, MITPress Publishers, June 2017 | ISBN: 9780262341110

**COURSE OUTCOMES:**

On completion of course, students should be able to

1. Understand and discuss what cognitive computing is, and how it differs from traditional Approaches
2. Analyze the business implications of cognitive computing
3. Apply natural language technologies to business problems
4. Develop applications for Watson.
5. Solve the case studies of cognitive computing.

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## (R20A0521) NATURAL LANGUAGE PROCESSING

**COURSE OBJECTIVES**:
1. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
2. To understand linguistic phenomena and learn to model them with formal grammars.
3. To Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
4. To learn how to manipulate probabilities, construct statistical models over strings and trees
5. To estimate parameters using supervised and unsupervised training methods.
6. To design, implement, and analyze NLP algorithms. Able to design different language modeling Techniques.

**UNIT – I:**
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

**UNIT – II:**
Lexical syntax: Hidden Markov Models (Forward and Viterbi algorithms and EM training).
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

**UNIT – III:**
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

**UNIT – IV:**
Predicate-Argument Structure, Meaning Representation Systems, Software.
Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure

**UNIT – V:**
Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

**TEXT BOOKS:**
1.        Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, PearsonPublication.
2.        Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

**REFERENCE BOOKS:**
    a.Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.


**COURSE OUTCOMES**:
1. Show sensitivity to linguistic phenomena and an ability to model them with formalgrammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
3. Able to manipulate probabilities, construct statistical models over strings and trees
4. Will be able to estimate parameters using supervised and unsupervised training methods.
5. Able to design, implement, and analyze NLP algorithms. Able to design different language modeling Techniques.

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| **(R20A6705) DEEP LEARNING** |
|---|

**OBJECTIVES:**

1. To acquire the knowledge of Deep Learning Concepts
2. To gain knowledge to apply Optimization strategies.
3. To be capable of performing experiments in deep learning using real world data
4. To improve the performance of the deep learning.
5. To learn supervised and unsupervised models.

**UNIT-I:**

INTRODUCTION TO DEEP LEARNING : Historical Trends in Deep Learning, Deep Feed-forward networks, Gradient -Based learning, Hidden Units ,Architecture Design, Back-Propagation and other Differentiation Algorithms.

**UNIT-II:**

DEEP NETWORKS: History of Deep Learning-A Probabilistic Theory of Deep Learning-Back propagation and regularization, batch normalization-VC Dimension and Neural Nets-Deep Vs Shallow Networks -Conventional Networks-Generative Adversarial Networks (GAN), Semi-Supervised Learning.

**UNIT-III**

 DIMENTIONALITY REDUCTION LINEAR (PCA, LDA ) manifolds, metric learning-Auto encoders and dimensionality reduction in networks-Introduction to convert- architectures

-AlexNet, VGG, Inception, ResNet-Training a convert: weights initialization ,batch normalization, hyperparameter optimization.

**UNIT- IV**

OPTIMIZATION AND GENERALIZATION : Optimization in Deep Learning-Non -convex optimization for deep networks-stochastic optimization Generalization in neural networks -spatial transformer networks-recurrent networks, LSTM-recurrent neural network language models-world-level RNNs & deep Reinforcement learning-computational & artificial neuroscience.

**UNIT- V**

CASE STUDY AND APPLICATIONS : Imagenet- Detection -Audio WaveNet-Natural Language Processing Word2Vec-joint Detection-Bioinformatics-Face Recognition-Scene Understanding-Gathering Image Captions.

**TEXT BOOKS:**

1.  Cosma Rohilla        Shalizi,Advanced    Data   Analysis      from  an      Elementary   Point  ofView,2015.
2.  Deng & Yu,Deep Learning:Methods and Applications,Now Publishers,2013
3.  Deep Learning : An MIT Press Book by Ian Goodfellow and Yoshua Bengio Aaron Courville.
4.  Michael Nielson,Neural Networks and Deep Learning,Determination Press,2015.
5.  Satish kumar,Neural networks:A classroom Approach,Tata McGraw-Hill Education,2004

**OUTCOMES:**

1. Ablity to select the Learning Networks in modeling real world systems.
2. Build own deep learning project.
3. Differentiate between machine learning, deep learning and artificial Intelligence.
4. Ability to use an efficient algorithm for Deep Models.
5. Ability to learn deep neural network implementation using the TensorFlow and Keras.

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# (R20A0520) DISTRIBUTED SYSTEMS
## (PROFESSIONAL ELECTIVE-III)

**COURSE OBJECTIVES:**
1. To learn the principles, architectures, algorithms and programming models used in distributed systems.
2. To analyze the algorithms of mutual exclusion, election & multicast communication.
3. To evaluate the different mechanisms for Interprocess communication and remote invocations.
4. To design and implement sample distributed systems.
5. To apply transactions and concurrency control mechanisms in different distributed environments.

**UNIT I**
**Characterization of Distributed Systems**: Introduction, Examples of Distributed systems, Resource Sharing and Web, Challenges.
**System Models**: Introduction, Architectural models, Fundamental models.

**UNIT II**
**Time and Global States**: Introduction, Clocks, Events and Process states, Synchronizing Physical clocks, Logical time and Logical clocks, Global states.
**Coordination and Agreement**: Introduction, Distributed mutual exclusion, Elections, Multicast Communication, Consensus and Related problems.

**UNIT III**
**Interprocess Communication**: Introduction, Characteristics of Interprocess communication, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.
**Distributed Objects and Remote Invocation**: Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case study: Java RMI.

**UNIT IV**
**Distributed File Systems:** Introduction, File service Architecture, Case Study: 1: Sun Network File System , Case Study 2: The Andrew File System.
**Distributed Shared Memory**: Introduction, Design and Implementation issues, Consistency Models.

**UNIT V**
**Transactions and Concurrency Control**: Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

**Distributed Transactions**: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

**TEXT BOOKS:**
1.       Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education. 2009.

**REFERENCES:**
1.       Distributed Systems, Principles and paradigms, Andrew S.Tanenbaum, Maarten Van Steen, SecondEdition,PHI.
2.       Distributed Systems, An Algorithm Approach, Sikumar Ghosh, Chapman & Hall/CRC, Taylor & Fransis Group,2007.


**COURSE OUTCOMES:**

1.  Able to compare different types of distributed systems and different models.
2.  Able to analyze the algorithms of mutual exclusion, election & multicast communication.
3.  Able to evaluate the different mechanisms for Interprocess communication and remote invocations.
4. Able to design and develop new distributed applications.
5.  Able to apply transactions and concurrency control mechanisms in different distributed environments.

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**(R20A0528)SOFTWARE TESTING METHODOLOGIES**
**(PROFESSIONALELECTIVE III)**

**COURSE OBJECTIVES**
1. To learn and under stand the tools and techniques of software testing and its practice in the industry.
2. To be aware of the differences between the various testing strategies.
3. To know the taxonomy and purpose of software testing tools.
4. Ability to learn path testing, domain testing
5. To know the data flow testing

**UNITI**
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs
**UNITII**
Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.
**Transaction Flow Testing**: Transaction flows, transaction flow testing techniques

**UNIT III**
**Dataflow testing**: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. **Domain Testing:-**domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain  and interface testing, domains and testability.
**UNIT IV**
Paths, Path products and Regular expressions : Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
**Logic Based Testing** : Overview, decision tables, path expressions, kv charts, specifications.
**UNIT V**
**State, State Graphs and Transition testing** : State graphs, good & bad state graphs, state
testing, Testability tips. Graph Matrices and Application : Motivational overview, matrix of graph, relations, power of amatrix, node reduction algorithm, building tools.

**TEXT BOOKS:**
1. Software Testing techniques - Boris Beizer, Dreamtech, secondedition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad,Dreamtech.
**REFERENCE BOOKS:**
1. The craft of software testing - Brian Marick, PearsonEducation.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit,Pearson.
4. Effective methods of Software Testing, Perry, JohnWiley.
5. Art of Software Testing – Meyers, JohnWiley.

## COURSE OUTCOMES:

Students will be able to:

1. Ability to test a process for continuous quality improvement
2. Generation of test cases from requirements
3. Analysis of Modeling techniques: UML: FSM and State charts, Combinatorial designetc.
4. Test generation from models.
5. Test adequacy assessment

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**(R20A0523) BIG DATA ANALYTICS**
**(PROFESSIONAL ELECTIVE-III)**

**COURSE OBJECTIVES**

Students will try to learn:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map Reduce.
3. To demonstrate the Big Data Architecture and its components, tools.
4. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
5. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

**UNIT I**

**INTRODUCTION TO BIG DATA AND ANALYTICS**

Classification of Digital Data, Structured and Unstructured Data-Introduction to Big Data: Characteristics– Evolution–Definition- Challenges with BigData-Other Characteristics of Data-WhyBigData-Traditional Business Intelligence versus BigData-DataWarehouse and Hadoop Environment BigData Analytics: Classification of Analytics– Challenges-Big Data Analytics important-Data Science- Data Scientist-Terminologies used in BigData Environments-BasicallyAvailableSoftStateEventualConsistency-TopAnalytics Tools

**UNIT II**

**INTRODUCTION TO TECHNOLOGY LANDSCAPE**

NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges– Hadoop Overview- Hadoop Distributed File System-Processing Data with Hadoop-Managing Resources and Applications with Hadoop YARN-Interacting with Hadoop Ecosystem

**UNIT III**

**INTRODUCTION TO MONGODB AND CASSANDRA**

MongoDB: Why MongoDB-Terms used in RDBMS and MongoDB-Data Types- MongoDB Query Language Cassandra: Features- CQLDataTypes–CQLSH–Key spaces- CRUD Operations– Collections-UsingaCounter-TimetoLive- AlterCommands-ImportandExport- Querying System Tables

**UNIT IV**

**INTRODUCTION TO MAPREDUCE PROGRAMMING AND HIVE**

MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression Hive: Introduction– Architecture-Data Types-File Formats- Hive Query Language Statements–Partitions– Bucketing–Views-Sub-Query–Joins– Aggregations– GroupbyandHaving-RCFileImplementation- HiveUserDefinedFunction-Serialization and Deserialization-Hive Analytic Functions

**UNIT V**

**INTRODUCTION TO PIG & JASPERREPORTS**

Pig:Introduction-Anatomy–Features–Philosophy-UseCaseforPig-PigLatinOverview- Pig Primitive Data Types- Running Pig- Execution Modes of Pig–HDFS Commands- RelationalOperators–EvalFunction- ComplexDataTypes-PiggyBank-User-Defined Functions–ParameterSubstitution-DiagnosticOperator- WordCountExampleusingPig- PigatYahoo!– Pig Versus Hive-Jasper Report using Jasper soft.

**Text Book:**

1. SeemaAcharya,Subhashini Chellappan,"BigDataandAnalytics",WileyPublications, FirstEdition, 2015

**Reference Books:**

1. JudithHuruwitz,AlanNugent,FernHalper,MarciaKaufman,"Bigdatafordummies",JohnWiley & Sons, Inc.(2013)

2. TomWhite,"HadoopTheDefinitiveGuide",O'ReillyPublications,FourthEdition, 2015

3. DirkDeroos,PaulC.Zikopoulos,RomanB.Melnky,BruceBrown,RafaelCoss,HadoopForDummies",Wiley Publications,2014

4. RobertD.Schneider,"HadoopForDummies",JohnWiley&Sons,Inc.(2012)

5. PaulZikopoulos,"UnderstandingBigData:AnalyticsforEnterpriseClassHadoopand StreamingData,McGrawHill,2012ChuckLam,"HadoopInAction",Dreamtech Publications,2010

## Course outcomes:

Students will be able to:

1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
3. Categorize and summarize Big Data and its importance.
4. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
5. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc

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### (R20A0529)   MICROSERVICES
### (PROFESSIONAL ELECTIVES – IV)

**COURSE OBJECTIVES**
   This course will enable students to
1. Understand Microservices Architecture based solutions.
2. Understand Microservices principles to specific business Requirements.
3. To familiarize the students with installation of MongoDB and Setup
4. To expose the students to the concept of Docker Architecture and container ecosystem
5. To understand the principles of Kubectl commands and cloud application component Architecture

**Unit I**

Motivation to Microservices, Monolithic Application, Components in Monolith Application , Advantages and Disadvantages of Monolithic Architecture, Scaling your Application, Domain-Driven Design, Everyone vision is Cloud Native : Evolutionary design – Concept of minimum viable product (MVP), Key Benefits of Microservices , Service-Oriented Architecture , Microservice different than Service-Oriented Architecture, Microservice Architecture, Characteristics of Microservices Architecture, Dealing with Complexity, Complexity of Microservices, Microservice Security, Authentication and Authorization, Service-to-Service Authentication.

**Unit II**

API Management and Gateways : API Management, Microservices, SOA, and APIs combined : Deep Integration , Service Exposure , REST API, The Future of Microservices, Microservices Governance, Centralized Versus Decentralized Governance, decentralization of Data Stores.

**Unit III**

Getting Started with NodeJS , Sample Project using Node Express command prompt, Nodeclipse plugin, Basic Routing, File System, Global Objects, View Templates, Serving Static Content, Handling HTTP and HTTPS, Connecting to Database, Connectivity, MongoDB Installation & Setup, NodeJS Mongo Driver, Performing CRUD Operations, Connection Pooling, Connection Pooling using NodeJS Mongo driver

**Unit IV**

Containers and Docker: Docker: A shipping container for code, Benefits of using containers, Virtual machines versus containers, Dev versus Ops, Docker Mission, Docker Adoption, Docker Basic Concepts, Docker Architecture, Docker Typical Workflow, Docker Shared and Layered File Systems Technology, Container Ecosystem, Container Orchestration

**Unit V**

Kubernetes, Kubernetes Strengths, Kubernetes Architecture, Master Node Components, Worker Node Components, Kubernetes Building Blocks, Deploying Applications on Kubernetes, Helm, Application Center Components, Pod Health Checking, Health Check Examples, Kubectl Commands, Kubectl Commands – Examples, Cloud Application Component Architecture, Benefits of using Kubernetes with IBM Containers

## Textbooks:

1. Building Microservices By Sam Newman  O'Reilly Publications
2. Microservice From Theory To Practice Red Books
3. The Docker And Container Ecosystem By Alex Williams
4. kubernetes Microservices With Docker By Deepak Vohra

## Course Outcomes:

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

1. Identify the characteristics of popular microservices, and understand the design differences.
2. Decompose a monolithic application on a single server into a containerized application on multiplecloud instances
3. Know how to make the appropriate Microservice Architecture decision
4. You will be able to recognize the various elements of the Docker architecture.
5. Perform basic kubectl commands.

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## (R20A0530) IT SERVICE MANAGEMENT AND AUTOMATION

### (PROFESSIONAL ELECTIVES – IV)

**COURSE OBJECTIVES**
1. Understand and explain the basic terminology and concepts of ITSM and its automation.
2. Understand and explain the functions, roles and processes for each of the phases of the Service Lifecycle.
3. Apply a service-oriented approach to business systems design and operations in order that an organization is more efficient and effective.
4. Understand, explain, analyze, and critique the concept of IT Service Management.
5. Students should able to use automation tools like Service Now& PEGA.

**UNIT I**
**IT Service Management**: Dentition, The Service Part of ITSM, Term Service Components/Elements of a Service, common service models.
Nature of services, service strategy, new service development, technology in services and service quality

**UNIT II**
**SERVICE DESIGN: FUNDAMENTALS AND PRINCIPLES**
**SERVICE DESIGN PROCESSES:** Service Catalogue Management, Service Level Management, Capacity Management, Availability Management, IT Service Continuity Management, Information Security Management, Supplier Management.

**UNIT III**
**SERVICE TRANSITION: FUNDAMENTALS AND PRINCIPLES**
**SERVICE TRANSITION PROCESSES:** Transition planning and support, Change Management, Service Asses Configuration Management, Service and Deployment Management, Service Validation and Testing, Evaluation, Knowledge Management.

**UNIT IV**
**SERVICENOW FOUNDATIONS:** Diving into the infrastructure Being in charge, Exploring Databases, building hierarchical tables Storing and Reference fields.

**UNIT V**
**PEGA**: Introduction to Business Process Management (BPM) and BPM environment in PEGA PRPC (PEGA rules process commander) environment, PRPC Tool overview, PEGA designer studio overview, PEGA installation.
Case Study: Building new application in PEGA using Application Wizard Too

**Text Books /References:**

1. Effective IT Service Management, To ITIL and Beyond! Rob Addy,Springer
2. B.Fitzsimmons, James A., and Mona J. Fitzsimmons, Service Management: Operations, Strategy, andInformation Technology, 6th Ed., Irwin/McGraw-Hill, 2007.
3. Matering Service Now,Martin Wood.
4. https://tekslate.com/pega-tutorials
5. https://community.pega.com/
6. https://www.youtube.com/watch?v=zSMOVfHgGU4

**COURSE OUTCOMES**:

After learning the concepts of this paper the student will be able to

1. Know the basic principles of Service Design and its fundamental.
2. Know the basic principles of Service Transition and its fundamental.
3. Students should also be prepared to sit for the IT Infrastructure Library (ITIL) Foundation certification exam
4. Acquire skills in Service Now automation tools, which helps them to automate IT Business Management (ITBM).
5. Understand the basic postulates of PEGA tool, is a Business Process Management tool (BPM).

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# (R20A0524) CLOUD COMPUTING
## (PROFESSIONAL ELECTIVES – IV)

**OBJECTIVES:**

1.      To understand the various distributed system models and evolving computing paradigms
2.      To gain knowledge in virtualization of computer resources
3.      To realize the reasons for migrating into cloud
4.      To introduce the various levels of services that can be achieved by a cloud.
5.      To describe the security aspects in cloud and the services offered by a cloud.

**UNIT- I**

Systems Modeling: Distributed System Models and Enabling Technologies- Scalable Computing over the Internet- System Models for Distributed and Cloud Computing- Software Environments for Distributed Systems and Clouds-- Performance, Security, and Energy Efficiency

Computer Clusters for Scalable Parallel Computing: Clustering- Clustering for Massive Parallelism- Computer Clusters and MPP Architectures-Design Principles of Computer Clusters-Cluster Job and Resource Management.

**UNIT- II**

Virtualization: Virtual Machines and Virtualization of Clusters and Data Centers-Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms-Virtualization of CPU, Memory, and I/O Devices-Virtual Clusters and Resource Management-Virtualization for Data-Center Automation

**UNIT- III**

Foundations: Introduction to Cloud Computing- Migrating into a Cloud-The Enterprise Cloud Computing Paradigm.

**UNIT- IV**

Infrastructure as a Service (IAAS)& Platform (PAAS):Virtual machines provisioning and Migration services-On the Management of Virtual machines for Cloud Infrastructures-Aneka—Integration of Private and Public Clouds

**UNIT- V**

Software as a Service ( SAAS)&Data Security in the Cloud:

Google App Engine – Centralizing Email Communications- Collaborating via Web-Based Communication Tools-An Introduction to the idea of Data Security- The Current State of Data Security in the Cloud- Cloud Computing and Data Security Risk- Cloud Computing andIdentity.

**TEXT BOOKS:**
1.      DistributedandCloudComputing,KaittwangGeoffreyC.FoxandJackJDongrra,ElsevierIn
        di a2012.
2.      MasteringCloudComputing-RajKumarBuyya,ChristianVecchiolaandS.TanuraiSelvi,TMH,2012.
3.      Michael Miller, Cloud Computing: Web-Based Applications That Change the Way
YouWork and Collaborate Online, Que Publishing, August2008.

**REFERENCE BOOKS:**
1.Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter,
    Tata McGraw Hill,rp2011.

2.Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press,2010.

3.Cloud Computing: Implementation, Management and Security, John
W.Rittinghouse, James F.Ransome, CRC Press,rp2012.

4.Cloud Application Architectures: Building Applications and Infrastructure in theCloud, George
Reese, O'reilly, SPD,rp2011.

5.Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, TimMather,
Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD,rp2011.

**COURSE OUTCOMES:**
1. To distinguish the different models and computingparadigms.
2. To explain the levels of virtualization and resourcesvirtualization
3. To analyze the reasons for migrating intocloud
4. To effectively use the cloud services in terms of infrastructure and operatingplatforms.
5. To apply the services in the cloud for real worldscenarios

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| **(R20A6783) DEEP LEARNING LAB** |
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**Course Objectives:**

1. To learn the principles and practices of supervised learning and deep learning

2. To learn how to use neural networks

3. To learn how to use keras and TensorBoard

4. Will be able to gain knowledge about learning systems TensorFlow which will be introduced with working examples

5. To learn mathematics and programming for deep learning.

**WEEK-1 :** Installation of Tensorflow & Keras(Tensorflow (v1.0.0), TFLearn, Keras, and many other pre-installed python libraries (Numpy, pandas)

**WEEK-2:** Data Manipulation (Numpy library) Operations Broadcasting Indexing and slicing

**WEEK-3:** Data PreprocessingReading the Dataset Handling Missing Data Conversion to the Tensor Format **WEEK-4:** Linear  Algebra Tensors Tensor arithmetic Implementing matrix multiplication

**WEEK-5:** Looping in Tensorflow

1. Gradient Implementation with chain rule and without chain rule

**WEEK-6**

Forward pass with matrix multiplication Forward pass with hidden layer (matrix multiplication) Forward pass with matrix multiplication with Keras

Forward pass with hidden layer (matrix multiplication)with Keras

**WEEK-7**

fcNN with only one neuron and plottingfcNN with one hidden layer and plottingCase study:

MNIST digit classification with and without hidden layers

**WEEK-8**

A simple CNN

Make a train and validation dataset of images with vertical and horizontal images

Defining the CNN to predict the knowledge from image classification

Visualizing the learned CNN Model

**WEEK-9:** MNIST digit classification before and after shuffling

Train CNN on Original Data

Train CNN on shuffled data

**WEEK-10:** Cifar10 classification with and without normalization

CNN as classification model for the Cifar10 dataset

CNN as classification model for the Cifar10 dataset

**WEEK-11 :** Using a pretrained Imagenet network to predict images into one of the 1000 Imagenet classes

**WEEK-12**

Implementation of Simple RNN,GRU RNN,LSTM RNN

Implementation of Deep RNN

**WEEK-13**

Case study of RNN shapes in image Captioning

Case study of RNN shapes in Text Translation

**COURSE OUTCOMES:**

- Students will be exposed to various Technologies using Tensorflow & Keras
- Students will be exposed to Data wrangling and processing
- Implementing various Neural Network architectures such as CNN, RNN.
- Student will able to implement digit classification and recognition.
- Student will able to implement Image & Video Processing and Text Translation

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### (R20A6683) NATURAL LANGUAGE PROCESSING LAB

## Course Objectives:

1. Be able to discuss the current and likely future performance of several NLP applications;
2. Be able to describe briefly a fundamental technique for processing language for several subtasks, such as morphological processing.
3. Implement  parsing, word sense disambiguation and etc.;
4. understand how these techniques draw on and relate to other areas of computer science;
5. Understand the basic principles of designing and running an NLP experiment.

**LIST OF EXPERIMENTS:**

**WEEK 1**
Implement latent semantic indexing. Work on British National Corpus.Link: http://www.natcorp.ox.ac.uk/ Construct the term document incidence matrix for this corpus. Now do the SVD using some inbuilt function/code/library. There is facility available in mat lab. You can do the assignment in any language. Java also has some package for the same.

**WEEK-2**
Use the Stanford named Entity recognizer to extract entities from the documents. Use it programmatically and output for each document which named entities it contains and of which type. You may first try the command line or demo version.

**WEEK-3**
Choose any corpus available on the internet freely. For the corpus, for each document, count how many times each stop word occurs and find out which are the most frequently occurring stop words. Further, calculate the term frequency and inverse document frequency as (Log of no of documents / no of documents having the term). The motivation behind this is basically to find out how important a document is to a given query.  For e.g.: If the query is say: "The brown crow". "The" is less important. "Brown" and "crow" are relatively more important. Since "the" is a more common word, its tf will be high. Hence we multiply it by idf, by knowing how common it is to reduce its weight.

**WEEK-4**
Use lucene for indexing the documents in a corpus. Choose any corpus available on the internet freely. Please get your corpus approved from me before working on it.  Fire a query and get the output as to whether the term is present in the document or not present in the document i.e. in other words documents containing the term as output.

**WEEK 5**
Read what is N-gram retrieval. Generate character 5 grams from the tokens extracted out of a corpus. Choose any corpus available on the internet freely. Generate a log-log plot of frequency vs rank order. Do the 5-grams follow Zipf's law? If so, what is the approximate value of alpha?

## WEEK 6

Suppose that we are designing a program to simulate the search in a dictionary. Words appear with different frequencies, however and it may be the case that a frequently used word which is in the stop list like "the" appear far from the root if they are sorted lexicographically while a rarely used word such as consciousness appears near the root. We want that the words that occur frequently in the text to be placed nearer to the root. Moreover, there may be words in the dictionary for which there is no definition. Organize an optimal binary search tree that simulates the storage and search of words in a dictionary.

## WEEK 7

Study and use the Stanford Part of speech tagger on a suitable corpus available freely. The corpus should be of decent size and get it approved before proceeding with experiments.

## WEEK 8

Solve the following text classification problem: Given a sentence identify whether the preposition used in it has a spatial sense or not. Use appropriate features.

## WEEK 9

You are given sets of questions in pairs. You have to identify whether the two questions are semantically same or not using supervised learning. Contact me for the dataset for this problem.

## WEEK 10

Choose any corpus available on the internet freely. Not necessary to create an inverted index. Just generate the vocabulary. Download and run Porter Stemmer. Execute the stemmer over terms in the vocabulary to create sets of equivalent terms, all of which stem to the same root form. Which set is largest? Identify a few sets that are inappropriately conflated by the stemmer.

## COURSE OUTCOMES

1.      Student will be able to implement LSI,NER

2.      Student will be able to implement TD-IDF method and Ngram models

3.      Develop a Part of speech tagger.

4.      Student can able classify the text based on part of speech tagger

5.      Student can able to implement several NLP applications