

**Dr.SNS RAJALAKSHMI COLLEGE OF ARTS  
AND SCIENCE  
[AUTONOMOUS]**

**DEPARTMENT OF COMPUTER SCIENCE**

**CURRICULUM STRUCTURE FOR UNDER-  
GRADUATE PROGRAMMES**

**2021-2024 BATCH**

**B.Sc COMPUTER SCIENCE**

**SEMESTER - 1**

முதற்பருவம்  
பகுதி - I - தமிழ்

தாள் - I (2UOT101) - (தற்கால இலக்கியம், சிறுகதை, இலக்கணம், பேச்சுக்கலை, இலக்கிய வரலாறு)

**அலகு -1 செய்யுள்**

1. புதிய ஆத்திச்சூடி - மகாகவி சுப்ரமணிய பாரதியார்

**விழுமியம் :** சமூக மதிப்புகளை உணர்ந்த மாந்தர்களே நாகரீகமிக்கவர்கள்

2. எங்கள் தமிழ் - பாவேந்தர் பாரதிதாசன்

**விழுமியம் :** தமிழ் மொழியின் தொன்மையினையும் சிறப்பினையும் உணர்ந்து  
மேன்மைப்படுத்துதல்

3. புத்தகம் - கவிக்கோ அப்துல் ரகுமான்

**விழுமியம் :** அனுபவக் கல்வியே வாழ்க்கையில் சிறந்த பாடம் புகட்டும்

4. வித்தியாச அன்னங்கள் - கவிப்பேரரசு வைரமுத்து

**விழுமியம் :** பெண் உணர்வுகளை மதித்தலே சிறந்த பெண்ணியம்

5. புழு - கவிஞர் சல்மா

**விழுமியம் :** பெண் மனத்தை உணர்ந்து அதற்கேற்ப செயல்படுதலே  
பெண்ணியத்தின் அடிப்படை

6. இரவு வரைந்த ஓவியம் - கவிஞர் அ.வெண்ணிலா

**விழுமியம் :** பெண் குழந்தைகளுடைய பாதுகாப்பின் அவசியத்தை உணரச் செய்தல்

**அலகு -2 - செய்யுள்**

7. பிரபஞ்ச தியானம் - கவிஞர் மாலதி மைத்ரி

**விழுமியம் :** சூழலியல் பெண்ணியத்தின் வழி தாய்மையைப் போற்றுதல்

8. நம்பிக்கையுடன் - கவிஞர் பா. விஜய்

**விழுமியம் :** தன்னம்பிக்கை உள்ள மனிதனே வாழ்வில் உயர்வான்

9. காற்றைக் காப்போம் - கவிஞர் பொன் செல்வக்குமார்

**விழுமியம் :** சுற்றுச்சூழலைப் பாதுகாத்தலின் வழி சூழலியல் தேவையை உணரச்செய்தல்

10. நாட்டுப்புறப் பாடல்கள்

**விழுமியம் :** வாய்மொழி வழக்காறுகள் வழி தமிழர் மரபைப் பேணுதல்

11. ஹைக்கூ கவிதைகள்

**விழுமியம் :** சமூக அவலங்களை இடித்துரைத்து சிறந்த பண்பாட்டாளர்களை உருவாக்குதல்

12. திரிசங்கு - கவிஞர் வி.ரொசாரியோ விஜோ

**விழுமியம் :** திருநங்கைகளின் உணர்வுகளை வெளிக் கொணர்வதன்  
வாயிலாக விழ்ப்புணர்வை ஏற்படுத்துதல்

**அலகு -3 சிறுகதைகள்**

1. கைதியின் பிரார்த்தனை - கல்கி

**விழுமியம் :** மனித நேயமிக்க மனிதர்களை உருவாக்குதல்

2. தெருவிளக்கு - புதுமைப்பித்தன்

**விழுமியம் :** வாழ்வின் எதார்த்தத்தை ஏற்றுக்கொள்ளுதல்

3. கருப்பண்ணசாமி யோசிக்கிறார் - அறிஞர் அண்ணா

**விழுமியம் :** பகுத்தறிவு சிந்தனையின் வழி வாழ்வின் உண்மை நெறிகளை அறிதல்

4. சுயரூபம் - கு. அழகிரிசாமி

**விழுமியம் :** வாழ்வில் தன்மானப்பண்பைப் போற்றுதல்

5. பூமாலை - ஆர். சூடாமணி

**விழுமியம் :** குறை நீக்கி நிறைவு காணுதல்

6. குறைப்பிறவி - ஜெயகாந்தன்

**விழுமியம் :** மனித வாழ்க்கைக்கு அன்பே ஆதாரம் என்பதை உணர்ந்து செயல்படுதல்.

7. அண்ணபூரணி மெஸ் - பாவண்ணன்

**விழுமியம் :** உதவும் மனப்பான்மையைப் போற்றுதல்

8. அண்ணாச்சி - பாமா

**விழுமியம் :** சாதி ஏற்றத் தாழ்வுகளைக் களைதல்

9. அப்பத்தா - பாரதி கிருஷ்ணகுமார்

**விழுமியம் :** உயிர்களிடத்து நேசம் அதிகரிக்க மனித உள்ளுணர்வுகளைப் புரிந்துகொள்ளும் தன்மையை வளர்த்துக்கொள்ளுதல்.

10. ஆழ்கடலின் மௌனம் - சுப.செல்வி

**விழுமியம் :** தெளிந்த சிந்தனை வழி வாழ்வில் உயர்நிலையை அடைதல்

#### அலகு-4 இலக்கணம்

- பெயர், வினை, இடை, உரிச்சொற்களின் பொது இலக்கணம்
- படிமம், குறியீடு, தொன்மம்

#### பேச்சுக்கலை

பேச்சுக்கலை வரலாறு, தமிழ்நாட்டில் பேச்சுக்கலை

பேச்சாளருக்குரிய அடிப்படைத் தகுதிகள், சிறந்த பேச்சின் இலக்கணம்

**பயிற்சிக்குரியன** - புதுக்கவிதை, சிறுகதை

(தலைப்புகள் மற்றும் வரையறைகள் கொடுத்து புதுக்கவிதை,

சிறுகதை எழுதச் செய்தல்)

#### அலகு -5 இலக்கிய வரலாறு கட்டுரைகள்

1. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
2. சிறுகதையின் தோற்றமும் வளர்ச்சியும்
3. ஹைக்கூ கவிதையின் தோற்றமும் வளர்ச்சியும்

பாட நூல்கள் : செய்யுள் திரட்டு ( தமிழ்த்துறை வெளியீடு)

சிறுகதைத் தொகுப்பு ( தமிழ்த்துறை வெளியீடு)

பார்வை நூல்கள் :

1. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு  
தமிழண்ணல்

மீனாட்சி புத்தக நிலையம்

மதுரை

பதிப்பு-2000

2. பேசும் கலை

முனைவர்.கு.ஞானசம்பந்தன்

விஜயா பதிப்பகம்

20, ராஜவீதி,

கோயமுத்தூர் - 641001

பதிப்பு -2012

3. வாருங்கள் பேச்சாளர் ஆகலாம்

முனைவர். உலகநாயகி பழனி

நியூ செஞ்சரி புக் ஹவுஸ்

சென்னை - 98

பதிப்பு - 2008

4. தமிழில் பிழையின்றி எழுவது எப்படி?

முனைவர் கோ.இளையபெருமாள்

வானதி பதிப்பகம்

23, தீனதயாளு வீதி,

சென்னை-600017

பதிப்பு - 2011

**PART- I HINDI PAPER - I**  
**COURSE CODE- 21UOH101**

<b>PART- I HINDI PAPER -I</b>	
<b>Unit No.</b>	
<b>I</b>	<b>PROSE : NUTHAN GADYA SANGRAH</b> Lesson 1 – Bharathiya Sanskurthi - Dr.Rajendra Prsad Lesson 3 – Razia - Ramaviksha Benipuri Lesson 4 – Makreal -Yespal Lesson 5 – Bahtha Pani Nirmala -‘AGEYA’ Lesson 6 – Rashtrapitha Mahathma Gandhi - Mukthibodh Lesson 9 – Ninda Ras - Harishankar Parsayi.
<b>II</b>	<b>NON DETAILED TEXT SHORT STORIES: KAHANI KUNJ</b> 1. Pareksha – Premchand 2. Mamtha - Jayashankar Prasad 3. Apna paraya - Jaynendrakumar 4. Admi ka bachcha - Yespal 5. Bolaram ka jeev - Harishankar Parsayi 6. Vapasi - Mannu Bhandari

<b>III</b>	<b>GRAMMAR : SHABDHA VICHAR ONLY</b> (NOUN, PRONOUN, ADJECTIVE, VERB, TENSE, CASE ENDINGS) Theoretical & Applied.
<b>IV</b>	<b>TRANSLATION : English – Hindi only.</b> ANUVADH ABHYAS – III (1-15 lessons only)
<b>V</b>	<b>COMPREHENSION:</b> 1 Passage from ANUVADH ABHYAS–III (16-30)

***Text Book:***

Nathan gadya sangrah, 2009, editor : Jayaprakash, publisher : Sumitra prakashan sumitravas, 16/4, hastings road, Allahabad – 211001.

Kahani kunj, 2011, Editor :V.P. Amithab.Publisher : Govind Prakashan Sadhar Bagaar, Mathura, Uttar Pradesh,–281 001

***Reference Books:***

NAVEEN HINDI VIYAKARAN,2002 Dakshin Bharat Hindi Prachar Sabha Chennai - 600017

## PART- I MALAYALAM PAPER - I

COURSE CODE: 21UOM101

Unit No.	PART- I MALAYALAM PAPER - I
I	Novel - PathummayudeAadu - Vaikam Muhammed Basher
II	Novel- - PathummayudeAadu - Vaikam Muhammed Basher
III	Short Story - EntePriyappetaKadhakal – Akbar Kakkattil)
IV	Short Story - EntePriyappetaKadhakal – Akbar Kakkattil)
V	Composition & Translation(English to Malayalam)

### Text Books

1.Novel – Pathummayude Aadu- Vaikam Muhammed Basher ( D.C.books,Kottayam,Kerala)

2.short story – entepriyappeta kadhakal-akbar kakkattil ( D.C.books,Kottayam,Kerala)

3.Expansion of ideas,General Essay and Translation( A Simple Passage)

### Reference Books

1.Malayala Novel SahithyaCharitram-K.M.Tharakan  
(N.B.S.Kottayam)

2.Chelukatha Innale Innu-M.Achuyuthan  
(D.C Books, Kottayam)

3.Sahithya CharitramPrasthanangalilude- Dr.K.M George,  
(D.C.Books Kottayam)

4. MalayalaSahithyavimarsam-Sukumar Azheekode  
(D.C.Books Kottayam)

## **PART II: ENGLISH – I**

### **21UOE201 - COMMUNICATIVE ENGLISH: THEORY AND PRACTICE**

**CONTACT HOURS/WEEK: 05**

**CREDITS: 04**

### **SYLLABUS**

#### **Unit- I**

##### **Listening Skills**

**(12hrs)**

- Critical Listening
- Comprehensive Listening
- Dialogic Listening
- Emphatic Listening
- Informational Listening

##### **Speaking Skill**

- Importance of Speaking skills
- Three main aspects of effective speaking
- Elements of speaking skills
- Methods to improve speaking skills

#### **UNIT II**

##### **Reading**

**(12hrs)**

- The Art of Effective Reading
- Need for Developing Efficient Reading
- Benefits of Effective Reading
- Speed of Reading
- Four Basics Steps to Effective Reading
- Overcoming the obstacles in Reading
- Tips for Effective Reading
- Types of Reading – Skimming and Scanning
- Reading Comprehension
- Reading and reporting an article
- Writing



- Precis Writing
- Paragraph Writing
- Structure of Paragraph
- Construction of Paragraph
- Essay Writing
- Structure of Essay
- Letter Writing
- Importance of Writing Letter
- Elements of Structure and Layout of Letter
- E-Mail Etiquettes

### **UNIT III**

#### **Grammar**

(12 hrs)

- Parts of Speech and its types
- Prefix and Suffix
- Sentence and its types
- Error Spotting
- Tenses
- Articles
- Question Tags
- Synonyms and Antonyms

### **UNIT IV**

#### **Lab Practice**

**(12hrs)**

- Listening Skills
- Reading Skills
- Sentence and its types
- Functions of Sentences
- Vocabulary
- Synonyms from the Context
- Writing Skills
- Reading Comprehension
- Meaning, Root word
- Foreign phrases

## UNIT V

### Lab Practice

(12hrs)

- Reading Comprehension
- Word Mentor
- Error Spotting
- Commonly confused words
- Guess the words
- Articles
- Anagrams
- Listen and Speak
- Dialogue Writing
- Paragraph Writing

### Prescribed Text Book

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sanjay Kumar, PushpLata	Communication Skills	Oxford University Press	2015

### REFERENCE BOOKS:

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Meenakshi Raman and Sangeeta Sharma	Fundamentals of Technical Communication	Oxford University Press	2015
2.	Neil Thompson	Effective Communication	Palgr Mac	2018
3.	Micheal Swan and Catherine Walter	Oxford English Grammar Course	Oxford University Press	2019

## 21UCU301: COMPUTATIONAL MATHEMATICS

CREDITS:4

MARKS: 40 + 60

### SYLLABUS

#### Unit I: Matrices

Matrices - Introduction - Determinants - Inverse of a matrix - Rank of a Matrix

#### Unit II: The solution of Numerical Algebraic & Transcendental equation

The solution of Numerical Algebraic and Transcendental equation - Bisection method - Newton - Rapshon method - False position method - Problems only

#### Unit III: System of Simultaneous Linear algebraic Equation

System of Simultaneous Linear algebraic Equation - Gauss elimination, Gauss Jordon. System of Simultaneous Linear algebraic Equation - Gauss Seidal methods - Gauss Jacobi Method - Problems only.

#### Unit IV: Measures of Central tendency and Measures of dispersion

Measures of central tendency: Mean, Median and Mode - Relationship among Mean, Median and mode (direct method). Measures of dispersion: Range, Quartile deviation, Mean deviation and Standard deviation (direct method).

#### Unit V: Correlation and Regression

Correlation and Regression - Types of relationship - Linear regression - Correlation - Coefficient of correlation - Rank correlation - Regression equation of variables - X on Y and Y on X - Problems only

#### TEXT BOOKS

1. **Numerical Methods in science & Engineering** by M.K. Venkataraman – NPC, Revised Edition -2005 (Unit II & III)
2. **Business Mathematics and Statistics** by P.A. Navaneetham (Unit I, IV & V)

#### REFERENCE BOOKS

1. **Numerical methods** by E. Balagurusamy Tata MC Graw Hill.
2. **Fundamental of Mathematical statistics** by S C Gupta, V. K. Kapoor Sultan Chand and Son

## 21UCU401- PROGRAMMING IN C

CREDITS:4

MARKS: 40 +60

### SYLLABUS

#### UNIT I: Introduction:

What is C - Getting Started with C - The First C Program – Compilation and Execution - Receiving Input - C Instructions - Control Instructions in C. The Decision Control Structure: The *if* Statement - The *if-else* Statement - Use of Logical Operators - The Conditional Operators.

#### UNIT II: The Loop Control Structure:

Loops - The *while* Loop - The *for* Loop - The *do-while* Loop - The *break* Statement - The *continue* Statement - The *do-while* Loop. The Case Control Structure: Decisions Using *switch - switch* Versus *if-else* Ladder - The *goto* Keyword.

#### UNIT III: Functions & Pointers:

What is a Function - Passing Values between Functions - Scope Rule of Functions - Calling Convention - Function Declaration and Prototypes - Call by Value and Call by Reference - An Introduction to Pointers -Pointer Notation -Back to Function Calls - Recursion - Recursion and Stack.

#### UNIT IV: The C Preprocessor:

Features of C Preprocessor - Macro Expansion - File Inclusion - Conditional Compilation - *#if* and *#elif* Directives. Arrays: What are Arrays - More on Arrays - Pointers and Arrays - Two Dimensional Arrays - Array of Pointers - Three Dimensional Array.

#### Unit V: Structures:

Why Use Structures – Array of Structures - Additional Features of Structures Uses of Structures. File Input/Output: File Operations - Closing the File - Counting Characters, Tabs, Spaces - A File-copy Program - File Opening Modes. Miscellaneous Features: Enumerated Data Type - Renaming Data Types with *typedef* -Typecasting - Bit Fields – Unions.

**TEXT(S)**

1. Let us C by Yashwant Kanetka, 5th Edition, PBP Publication, 2016, ISBN-10: 8183331637; ISBN-13: 978-8183331630.

**Reference:**

1. The C programming Language by Richie and Kernighan, 2004, BPB Publication, ISBN: 0131103628
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill, ISBN: 0070681821

## 21UCU402-COMPUTER SYSTEM ARCHITECTURE

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

#### **Unit I: DATA REPRESENTATION:**

Data Types – Number Systems – Radix , Decimal, Binary, Octal, Hexadecimal – Conversion – Octal and Hexadecimal Numbers – Decimal Representation – BCD – Alphanumeric Representation – ASCII – Complements – 9's, 10's, 1's and 2's Complement – 2's Complement Addition – 2's Complement Subtraction – Other Binary Codes – Gray Code – BCD – Weighted Code – Excess-3 Code – EBCDIC – Error Detection.

#### **Unit II: Logic**

Digital Computers – Introduction – Block Diagram – Logic Gates – Definition – AND, OR, NOT, NAND, NOR, XOR, X-NOR with Truth Tables – Boolean Algebra – Introduction – Boolean Expression – Basic Identities – DeMorgan's Theorem – Map Simplification – Karnaugh Map – Introduction – Minterm – Product of Sums Simplification – Don't Care Conditions.

#### **Unit III: COMBINATIONAL CIRCUITS:**

Introduction – Block Diagram – Half Adder – Full Adder – Binary Adder – Parallel Binary Adder - Binary Subtractor. SEQUENTIAL CIRCUITS: Flip-flops – Introduction – SR flip-flop – D flip-flop – JK flip-flop – T flip-flop – Edge triggered flip-flop – Master – Slave.

#### **Unit IV: DIGITAL COMPONENTS**

Integrated Circuits – Introduction – Decoders – NAND Gate Decoder – Decoder Expansion – Encoder – Multiplexer – Demultiplexer – Registers – Register With Parallel Load – Shift Registers – Binary Counters – Memory Unit – Random Access Memory (RAM) – Read Only Memory (ROM)

#### **UNIT-V: INPUT-OUTPUT ORGANIZATION**

Peripheral Devices – ASCII – Input Output Interface – I/O Bus and Interface Modules – I/O versus Memory Bus – Isolated versus Memory – Mapped I/O- Examples of I/O Interface – Asynchronous Data Transfer – Strobe Control – Handshaking.

**TEXT(S)**

1. M.Morris Mano,"Computer System Architecture"- 3rd Edition, Prentice Hall of India ,2000, ISBN-10: 0131663631

**REFERENCE MATERIALS**

1. V.K. Puri, "DIGITAL ELECTRONICS CIRCUITS AND SYSTEMS" McGraw Hill Education (1 July 2017). ISBN-10: 9780074633175 , ISBN-13: 978-0074633175
2. William Stallings, "Computer Organization and Architecture, Designing for Performance"-PHI/ Pearson Education North Asia Ltd., 10<sup>th</sup> Edition 2016, ISBN 978-0-13-410161-3 — ISBN 0-13-410161-8.

## **21UCU551- COMPUTER LABORATORY 1: C PROGRAMMING**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

1. if, if-else control structures
2. Different looping structures
3. Arrays
4. Functions and recursion
5. Pointers
6. C Preprocessor
7. Structures and Unions
8. Strings
9. Files
10. Bitwise operator

#### **Tools Required:**

Turbo C or C++ / CGCC compilers / Code-Blocks / GNU-GCC / GNAT Programming Studio (GPS) / CodeLite / Dev C++

#### **TEXT(S)**

Let us C by Yashwant Kanetka, 5th Edition, PBP Publication, 2016, ISBN-10: 8183331637; ISBN-13: 978-8183331630.

#### **REFERENCE(S)**

1. The C programming Language by Richie and Kernighan, 2004, BPB Publication, ISBN: 0131103628
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill, ISBN: 0070681821



**ABILITY (SKILL) ENHANCEMENT**  
**21UAB381 – SOFT AND QUANTITATIVE SKILLS-I**  
**SEMESTER I – LISTENING & READING SKILLS**

**Unit I** - Orientation & Motivation – Bridge the gap between school and college , success stories with Alumni / Alumna students - Placement & Training Orientation - Awareness Program, SWOT Analysis – Way to sell yourself - Methods to Analyse strength & Weakness.

**Activity** -PPT Presentation, Video sessions, SWOT Report

**Evaluation** - Listening & Reading – Pre Assessment

**UNIT II** - Understanding the importance of Communication – Listening, Reading, Writing & Speaking & Types of communication. Importance of listening, Listening tips & techniques, Listening Practice Listening Dilemma, Interactive Listening.

**Activity** -Communication is an art – group activity

**Evaluation** – Listening Mid Assessment 1

**UNIT III** - Communication Jungle – Understanding why some people are better listeners and their advantage - Seven Levels of Listening, Bad Listening habits and remedies.

**Activity** - Audio session with listening & responding

**Evaluation** – Listening Mid Assessment 2

**UNIT IV** - Challenging Speakers, Listening Skills for Eliciting discussions, Responding to Messages with questionnaire - Behavioural skills\_styles of behaviour, attitude, change management

**Activity** – Video Session / English lab session

**Evaluation** – Listening Mid Assessment 3

**UNIT V-** Understanding the importance of reading, Types of Reading - Complex, interactive, Purposeful reading...

**Activity** - Reading simple stories

**Evaluation** - Reading - Mid Assessment 1

**UNIT VI**-Phonetics – Proper pronunciation and common mistakes in pronunciation - Effective Reading – Reading with stress & Intonation.

**Activity** - Audio Session, Reading Articles in Newspaper, Dialogue reading

**Evaluation** - Reading - Mid Assessment 2

**UNIT VII**- Taxonomies of Reading skills, improving reading speed

**Activity** - Novel Reading Story reviews

**Evaluation** -Reading - Mid Assessment 3

**UNIT VIII**-Extensive Practice on Reading and Listening.

**Activity** -Note mapping, Mind Mapping , Book review

**Evaluation** - Final Assessment – Listening & Reading

### **Reference Books**

1. Everyone Communicates – John Maxwell
2. Communication skills for professionals – Nira Konar
3. Personality development & Communication skills – Dr. S.S Narula

## **21UFC901 - COMPULSORY FOUNDATION - I: ENVIRONMENTAL STUDIES**

**CREDITS:2**

**MARKS: 40 + 60**

### **UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES**

Natural Resources - Definition, scope and importance, need for public awareness and their associated problems of

**A- Forest Resources-** use and over exploitation, deforestations, tribal extraction and mining.

**B- Water Resources** use and utilization of surface and ground water, floods, drought, conflicts, overwater, dams- benefits and problems.

**C- Mineral Resources** use and exploitation, environmental effects of extracting and using mineral resources.

**D- Food Resources-** world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer, pesticide problems, water logging and salinity

**E- Energy Resources-** growing energy needs, renewable and non-renewable energy- uses of alterable sources.

**F- Land Resources-** land degradation, man induced landslides, soil erosion and desertification, role of an individual in conservation of natural resources, equitable use of resources for sustainable life styles.

### **UNIT – II ECOSYSTEM**

Concepts of an ecosystem- structure and functions of an ecosystem producers, consumers and decomposers. Energy flow in an ecosystem- ecological suggestion, food chain. Food web and ecological pyramids. characteristics features, structures and functions of the forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem (ponds, streams, lakes, rivers, oceans and estuaries).

### **UNIT – III BIODIVERSITY**

Introduction- definition- genetic, species and ecosystem diversity – bio geographical classification of India - value of biodiversity, consumptive use, productive use, social, ethical, aesthetic and option values- biodiversity at global, national and local levels- India as a mega diversity nation, hot spots of biodiversity, threads to biodiversity, habitat loss, poaching of wildlife, man-wildlife conflicts,

endangered and endemic species of India- conservation of biodiversity through in situ and ex situ methods.

#### **UNIT –IV ENVIRONMENTAL POLLUTION**

Definition, causes, effects and control measures of air, water, soil, noise, thermal pollution- solid waste management: causes, effects and control measures of urban and industrial waste- role of an individual in prevention of pollution- pollution case studies-disaster management: floods, earthquakes, cyclone and landslides, Tsunami, Drought.

#### **UNIT – V SOCIAL ISSUES AND THE ENVIRONMENT**

Sustainable development- urban problems related to energy- water conservation, rain water harvesting, watershed management- resettlement and rehabilitation of people, its problems and concerns, case studies. Environmental ethics; issues and possible solution climate change, global warming, ozone layer depletion, acid rain, nuclear accident and holocaust, case studies- consumerism and waste products- environmental protection Act- Air(prevention and control of pollution) Act- Water (prevention and control of pollution) Act, 1974 - Wildlife production Act- Forest conservation Act- Issue involved in enforcement of environmental legislation, Environment Impact Assessment ( EIA ) Earth Summit - public awareness- human population and the environment- population growth and distribution- population explosion- family welfare programme- environment and human health- human rights- value education- HIV/AIDS- women and child welfare- Role of information technology on human health- Role of computer in environment and human health

#### **Text book:**

- “Environmental Studies”, *N. Arumugam, V. Kumaresan*, 4<sup>th</sup> edition- 2014, Saras Publication, Nagercoil.

#### **References:**

- “Environmental Studies”, *Dr.J.P.Sharma*, 6<sup>th</sup> Edition – 2013, University Science Press, Coimbatore.

- “Environmental Studies for UG students”, *R.C.Sharma, Dr. Gurbir Sangha*, 3<sup>rd</sup> Edition - 2009, Kalyani Publication, Coimbatore.
- “Environmental Studies for UG Courses”, Bharathiar University, Coimbatore.

# SEMESTER - II

இரண்டாம் பருவம்  
பகுதி - I - தமிழ்  
தாள் - II (21UOT102) - (சங்கஇலக்கியம், உரைநடை, இலக்கணம்,  
பேச்சுக்கலை, இலக்கிய வரலாறு)

**செய்யுள்: அலகு - 1 செய்யுள் (காப்பியங்கள்)**

1. சிலப்பதிகாரம் - வேளிற்காதை  
**விழுமியம்** : பிரிவாற்றாமையால் ஏற்படும் துன்பங்களை  
எடுத்துரைத்தல்
2. கம்பராமாயணம் - வாலிவதைப் படலம்  
(48 பாடல்கள் - பாடல் எண்-75 முதல் 123வரை)  
**விழுமியம்** : அறநெறியின் மாண்பையும்  
தேவையையும் வலியுறுத்துதல்

**அலகு - 2 செய்யுள் (சங்க இலக்கியம்)  
எட்டுத்தொகை**

**அகம்**

1. நற்றிணை (பாடல் எண்-70)  
**விழுமியம்** : அன்பின் மேன்மையை உணர்த்துதல்
2. ஐங்குறுநூறு - கள்வன் பத்து (பாடல் எண்-21, 22, 26)  
**விழுமியம்** : அன்பின் வழியது அகவாழ்வு
3. அகநானூறு (பாடல் எண்-190)  
**விழுமியம்** : அறத்தொடுநின்றலின் வழி அகமரபினை  
அறியச் செய்தல்
4. கலித்தொகை (பாடல் எண்-63)  
**விழுமியம்** : அகவாழ்வின் அடிப்படைப் பண்புகளை  
எடுத்துரைத்தல்

**புறம்**

1. புறநானூறு (பாடல் எண்-189)  
**விழுமியம்** : முன்னோர்களின்; வீரத்தையும் போர்  
முறையையும் எடுத்தியம்புதல்

**சீத்தர் பாடல்கள்**

1. அகஸ்தியர் ஞானம் - 9 (பாடல் எண்-4)  
**விழுமியம்** : வாழ்வியல் நெறிகளை எடுத்துரைத்தல்

**பதினென் கீழ்க்கணக்கு நூல்கள்**

1. திருக்குறள் - குறிப்பறிதல்  
**விழுமியம்** : அகத்திணை மரபினை உணரச் செய்தல்
2. நாலடியார் - நல்லினம் சேர்தல் (பாடல் எண்-171, 172)

**விழுமியம்** : நற்பண்பினரோடு சேர்தலின் பயன் குறித்து எடுத்துரைத்தல்

3. இனியவை நாற்பது (பாடல் எண்-3,18)

**விழுமியம்** : வாழ்வு இனிமையுற நெறிமுறைகளை எடுத்தியம்புதல்

### **நீதிநூல்கள்**

1. நன்னெறி (பாடல் எண் - 36)

**விழுமியம்** : வாழ்க்கைக்குத் தேவையான நல்ல நெறிமுறைகளைப் பின்பற்றுதல்

### **சுற்றிலக்கியங்கள்**

1. நந்திக்கலம்பகம் (பாடல் எண்- 44)

**விழுமியம்** : பிரிவாற்றாமையை உணர்த்துதல்

2. கலிங்கத்துப்பரணி (பாடல் எண்- 409,489)

**விழுமியம்** : வீர உணர்வையும் போர் திறத்தையும் உணரச் செய்தல்

### **அலகு - 3 உரைநடை**

1. பழங்காலத்து அணிகலன்கள் - மயிலை சீனி வேங்கடசாமி

**விழுமியம்** : சங்ககால தமிழர்கள் பயன்படுத்திய

அணிகலன்கள் பற்றி அறிதல்

2. பொதுவுடைமை - வே.ஆனைமுத்து (ப.ஆ)

**விழுமியம்**: பொதுவுடைமைச் சிந்தனை குறித்து தெளிதல்

3. விழா - அநன்

**விழுமியம்** : தமிழர்களின் திருவிழா

கொண்டாட்டங்களையும்

பழக்கவழக்கங்களையும் அறிதல்

4. கொங்குநாடு - முனைவர் சி.சுப்பிரமணியம்

**விழுமியம்** : கொங்கு நிலப்பரப்பு குறித்த வரலாற்றையும் அமைவிடத்தையும் அறிதல்

### **அலகு - 4 (இலக்கணம்)**

• தொகைநிலைத் தொடர், தொகாநிலைத் தொடர்

### **பேச்சுக்கலை**

மேடைப்பேச்சின் வகைகள் - உரை வகைகள் - பட்டிமன்றம்-

சொற்போர் - சொற்பொழிவு

**பயிற்சிக்குரியன** - விண்ணப்பங்கள் எழுதச்செய்தல்



**அலகு - 5 இலக்கிய வரலாறு கட்டுரைகள்**

1. உரைநடையின் தோற்றமும் வளர்ச்சியும்
2. பதினெண் கீழ்க்கணக்கு நூல்கள்

**பாட நூல் : செய்யுள் திரட்டு ( தமிழ்த்துறை வெளியீடு)**

**பார்வை நூல்கள் :**

- 1.தமிழ் இலக்கிய வரலாறு  
மு.வரதராசன்  
சாகித்திய அகாடமி  
புதுடெல்லி-110001  
பதிப்பு-2001
2. கொங்கு நாடு  
முனைவர் சி.சுப்ரமணியம்  
காவ்யா பதிப்பகம்  
சென்னை -600024  
பதிப்பு-2001
3. பழங்காலத் தமிழர் வாணிகம்  
மயிலை.சீனி.வேங்கடசாமி  
நாம்தமிழர் பதிப்பகம்  
திருவல்லிக்கேணி, சென்னை – 600005  
பதிப்பு – 2007

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**PART- I HINDI PAPER - II**  
**COURSE CODE- 21UOH102**

	<b>PART- I HINDI PAPER - II</b>
<b>Unit No.</b>	
<b>I</b>	<b>MODERN POETRY :</b> <b>PANCHVATI by MYTHLI SHARAN GUPT</b>
<b>II</b>	<b>ONE ACT PLAY: EKANIKI PIYUSH</b>  1. Owrangjeb ki aakirirath– Ramkumar varma 2. Ek din - Lakshminarayan Misra 3. Vapasi - Vishnuprabhakar 4. Badsurath rajkumari - Krishnachandra 5. Aakket - Harijeeth
<b>III</b>	<b>LETTER WRITING</b> (Leave Letter, Job Application, Ordering Books, Letter to publisher, Personal Letter)

<b>IV</b>	<b>CONVERSATION:</b> (Doctor & Patient, Teacher & Student, Storekeeper & Buyer, Two Friends, Booking Clerk & Passenger at Railway Station, Auto rickshaw driver and Passenger) Ref : Bolchal Ki Hindi Aur Sanchar by Dr. Madhu Dhavan Vani Prakashan, New Delhi.
<b>V</b>	<b>TRANSLATION: HINDI-ENGLISH ONLY</b> Lessons – 1-15 only ANUVADH ABYAS-III

**TEXT BOOK:**

1. PANCHVATI, MYTHILI SHARAN GUPT, 2015, RAJKAMAL RAKASHAN, 1B NETHAJI SUBASH MARG, NEW DELHI.
2. EKANIKI PIYUSH ,SRIMATHI USHA MEHRA, 1999, HINDU SAHITHYA BHANDAR,55 CHOUPATTYAN RODE, LACKNOW 226003

**REFERENCE BOOKS:**

1. BOLCHAL KI HINDI AUR SANCHAR, 2015, DR. MADHU DHAVAN VANI PRAKASHAN, NEW DELHI.
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**PART- I MALAYALAM PAPER - II**

**COURSE CODE: 21UOM102**

Unit No.	PART- I MALAYALAM PAPER - II
<b>I</b>	Novel -Enmakaje
<b>II</b>	Novel - Enmakaje
<b>III</b>	Memories – Neermaathalam Poothakaalam
<b>IV</b>	Memories – Neermaathalam Poothakaalam
<b>V</b>	Translation (English to Malayalam)

**Text Books:**

1. Emakaje – AmbikasuthanMangad – DC Books Kottayam,Kerala

2. NeermaathalamPoothakaalam - Madhavikutty -DC Books Kottayam, Kerala

**Reference Books:**

1. Athmakathasahithyam Malayalathil-Dr.Vijayalam Jayakumar (N.B.S.Kottayam)

2. Malayala Novel SahithyaCharitram-K.M.Tharakan (N.B.S.Kottayam)

3. SahithyaCharitramPrasthanangalilude- Dr.K.M George,(D.C.BooksKottayam)

4. MalayalaSahithyavimarsam-Sukumar Azheekode (D.C.books)

**PART II : ENGLISH - II**

**21UOE202 BUSINESS ENGLISH: THEORY AND PRACTICE**

**CONTACT HOURS/WEEK: 05**

**CREDITS: 04**

**SYLLABUS**

**Unit-I**

(12hrs)

**Academic Listening**

- Inferential Listening
- Analytical Listening

**Verbal and Non-Verbal Communication**

- Body Language
- Posture
- Gesture
- Eye Contact
- Space – Distancing

## Grammar

- Clauses
- Voice – Active & Passive
- Degrees of Comparison
- Conditional Clauses
- Reading Comprehension

## **Unit-II**

**(12hrs) \**

### **Professional Writing**

- Standard Business Letter
- Report Writing
- Preparing Agenda
- Writing Minutes for Meeting
- Note- Making on a Business Conversation
- Case Study and Documentation

### Speaking Skills

- A Peek into the World of telephone
- Basics of Telephone Communication
- Telephone Courtesy
- Different kinds of Calls
- Listening for Tone, Mood and Attitude
- Teleconference

### **Phonology**

- Vowels
- Diphthongs
- Consonants

## **Unit-III Writing**

**(12hrs)**

### **Interview Techniques**

- Applying for Jobs
- Cover Letters
- Resume Writing
- Effective Profiling
- Interviews
- Group Discussion

- Tips for Interviews
- Preparing for Interview

#### **Unit-IV - Lab Practice**

**(12hrs)**

- Reading and Writing
- Effective Reading
- Reading Strategy
- Analysis of Sentence
- Story Telling
- Self – Introduction
- Reading Comprehension
- Introducing Others
- Error Spotting
- Commonly Confused Words
- Guess the words
- Idioms and Phrase

#### **Unit-V Lab Practice**

**(12Hrs)**

##### **Phonetics**

- Phonology
- Pure Vowels
- Diphthongs
- Plosive Consonants
- Fricatives
- Affricates
- Nasal Sounds
- Gliding Sounds
- Lateral Sounds
- Stress
- Intonation
- Rhythm

**PRESCRIBED TEXT BOOK**

S.NO	Author(s)	Title of the Book	Publisher	Year of Publication
1	Sanjay Kumar, PushpLata	Communication Skills	Oxford University Press	2015

**REFERENCE BOOKS:**

Sl.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Helen Naylor and Raymond Murphy	Essential Grammar in use Supplementary Exercises	Cambridge University Press	2007
2	Guy Brook-Hart	Business Benchmark	Cambridge University Press	2006
3	Course Team, Bharathiar University	Communication Skills – A Multi-Skill Course	Macmillan Publisher	2010
4	J.D.O Conor	Better English Pronunciation	Cambridge University Press	1998

**21UCU302: DISCRETE STRUCTURES & OPTIMIZATION TECHNIQUES>****CREDITS:4****MARKS: 40 + 60****SYLLABUS**

**Unit I: Relations and Functions** Relations - Types of Relations - Equivalence relations - Matrices of Relations - Functions - Types of function - Inverse function.

**Unit II: Logic Connectives [**

Logic - Introduction - Connectives - Equivalence formulas - Tautological implications - Normal forms - (PCNF & PDNF)

**Unit III: Linear Programming Problems**

Linear Programming - Formulation - Graphical method and Simplex Method.

**Unit IV: Transportation and Assignment problems**

Transportation Problems: Balanced and unbalanced transportation problems - Finding IBFS using NWC, LCM and VAM methods (non degenerate solutions only) - Optimal solution using MODI method. Assignment problems: Solving balanced and unbalanced assignment problems using Hungarian method.

### **Unit V: CPM and PERT**

CPM - Principles - Construction of Network for projects - Types of Floats.

PERT- Time scale analysis - critical path - probability of completion of project - Advantages and Limitations.

### **TEXT BOOKS**

1. **Discrete Mathematics** by Prof. V. Sundaresan, K.S. Ganapathy Subramanian, K.

Ganesan –Nov.2002, A.R. Publications.

**Unit I:** Chapter 1: Sections: 1.11 to 1.17, 1.23, 1.24, 1.28 to 1.36.

**Unit II:** Chapter 2: Sections: 2.1 to 2.4.

2. **Resource Management Techniques** by Prof.V.Sundaresan, K.S.Ganapathy Subramanian K.Ganesan, .A.R. Publications.

**Unit III:** Chapter 2: Sections: 2.1, 2.3, 2.5 and 2.6.

Chapter 3: Sections: 3.1.3, 3.1.4.

**Unit IV:** Chapter 7: Sections: 7.1, 7.2, 7.4.

Chapter 8: Sections: 8.1-8.6.

**Unit V:**Chapter 15: Sections: 15.1-15.7.

### **REFERENCE BOOKS**

1. **Operations Research**, KantiSwarup, Gupta R.K, Manmohan, S .Chand & Sons Education Publications, New Delhi, 12<sup>th</sup> revised Edition.
2. Problems in Operations Research – Manmohan ,P.K.Guptha.



## **21UCU403 - OBJECT ORIENTED PROGRAMMING**

**CREDITS:4**

**MARKS: 40 +60**

### **SYLLABUS**

**Unit I: C++Basics** : Overview - C++ Functions : Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions

**Unit II: Pointer and I/O and File management** : Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions. **Streams:** Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++File stream classes, File management functions.

**Unit III: JAVA BASICS** : Classes and Objects – Strings – Inheritance – Polymorphism and Interfaces -Regular Expressions – Exception Handling.

**Unit IV: JAVA GUI, FILE STREAM AND CONCURRENCY** :GUI Development using SWING – I/O Streams and Object Serialization – Generic Collections – Concurrency – Thread States and Life Cycles – Thread Synchronization – Java Networking.

**Unit V: CLIENT SIDE ESSENTIALS** : Java Script Objects and Functions – JQuery – Accessing DOM Elements using Java Script and JQuery Objects – Java Script Event Handling – XML DOM – AJAX Enabled Rich Internet Applications with XML and JSON – Dynamic Access and Manipulation of Web Pages using Java Script and JQuery – Web Speech API – Speech Synthesis Markup Language.

**TEXT(S)**

1. C++ The Complete Reference, 5th Edition, Herbert Schildt, McGraw-Hill Education, ISBN:0071634800, 9780071634809
2. The Complete Reference, JAVA, McGraw-Hill Education; Tenth Edition, ISBN 10: 1259589331,9781259589331

**21UCU404, OPERATING SYSTEM**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I: Operating System Basic**

Introduction, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Kernel Data Structures, System calls, Computing Environments, Open-Source Operating Systems.

**Unit II: Process Management**

Processes, Process scheduling algorithms, Inter process Communication, Examples of IPC Systems, Threads, Multi core Programming, Multithreading Models, Thread Libraries, thread issues. Process Synchronization: Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors, CPU Scheduling, Scheduling Criteria, Thread Scheduling.

### **Unit III: Deadlocks**

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

### **Unit IV: Memory Management**

Swapping, Contiguous Memory Allocation, Paging, Segmentation, Intel 32 and 64-bit Architectures, ARM Architecture. **Virtual-Memory Management:** Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Allocating Kernel Memory.

### **Unit V: Storage Management**

Overview of Mass-Storage, Disk Structure, Disk Attachment, Disk Scheduling, File System Interface, File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

### **TEXTS**

1. Silberschatz, P.B. Galvin & G. Gagne, Operating system concepts, 2013, 9th Edition, John Wiley, Edition. ISBN: 978-0-470-88920-6

### **REFERENCE MATERIALS**

1. W. Stallings, Operating Systems: Internals and Design Principles, 2012, 7th Edition, PHI. ISBN 13: 9780133805918. ISBN 10: 0133805913.
2. Andrew S. Tanenbaum, Modern operating system, 2014, 4th Edition, Pearson. ISBN-10: 1292025778 ISBN-13: 978-1292025773

## **21UCU552, COMPUTER LABORATORY 2: JAVA & PYTHON**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

#### **Java:**

1. Exception Handling.
2. Threads.
3. Interfaces.
4. Applet and AWT package.
5. JDBC.

#### **Python:**

6. Search Techniques.

7. Matrices Multiplications.
8. Function overloading with different function signatures.
9. Internal and External Library.
10. Class, Instances and Inheritance.

**Tools Required:**

Java SE Development Kit / NetBeans / Eclipse / IntelliJ IDEA / JDeveloper / DrJava  
Anaconda / PyCharm / Spyder / Pydev / Idle / Wing / Eric Python / Rodeo

**TEXT(S)**

1. Java: The Complete Reference, Herbert Schildt, McGraw Hill Education; Ninth edition, 2017, ISBN-10: 9339212096, ISBN-13: 978-9339212094
2. <http://python.cs.southern.edu/pythonbook/pythonbook.pdf>

**REFERENCE(S)**

1. The Java Handbook, Partic Naughton, McGraw Hill Education, 1 edition, 1996, ISBN-10: 0074632906, ISBN-13: 978-0074632901
2. <http://docs.python.org/tut/>

**Ability (Skill) Enhancement  
Soft and Quantitative Skills – II**

**21UAB382 -SPEAKING SKILLS & WRITING SKILLS**

**UNIT I** - Goal setting -Verbal & Non Verbal Communication, Importance of Speaking & Writing

Personal Grooming, Good social and business Etiquettes , Professional Attitude

**Activity** -Fantasy career- Wordless Acting, silent messages -Stack the deck -Video sessions

**Evaluation- Speaking & Writing – Pre Assessment**

**UNIT II** -Tenses & Parts of speech -Basic Sentence Formation –

**Activity** -Practice with exercise -Communication shutdowns - Self Introduction

**Evaluation- Speaking – Mid Assessment 1**

**UNIT III** - Aspects of effective speaking , Accents, Effect of breath on Voice and Speech ,  
Vocal Production

**Activity** -Introduction Bingo, colour block

**Evaluation-Speaking – Mid Assessment 2**

**UNIT IV** -Understanding words- Root words, prefix and suffix -Just a minute, extempore ,  
presentation, Role play

**Activity** -Practice exercise - Video recording session

**Evaluation- Speaking – Mid Assessment 3**

**UNIT V** - Common grammatical mistakes, email writing , passage writing

**Activity** -Practice exercise, story writing, word connectors

**Evaluation -Writing - Mid Assessment 1**

**UNIT VI** - Sentence correction, spot the error

**Activity** -Practice exercise

**Evaluation -Writing - Mid Assessment 2**

**UNIT VII** - Para jumbles, vocabulary building words of emotions, different degree of emotions

**Activity** -Rephrasing answers, Practice exercise

**Evaluation -Writing - Mid Assessment 3**

**UNIT VIII** -Group discussion, Essay writing

**Activity** -Mock GD, Essay writing assignments

**Evaluation** -Final Assessment – Speaking & Writing

**Reference Books**

1. Speak better Write better – Norman Lewis
2. Effective Speaking skills – Terry ‘O’ Brien
3. Objective General English by S P Bakshi
4. Advanced English Grammar – Raymond Murphy

**21UCS151, VALUE ADDED COURSES:  
DESIGN OF ONLINE COMMUNITIES**

**CREDITS:2**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I:**

How to Manage Your Community: Community Management Activities-Strategy: Developing a Community Strategy-The Community Lifecycle-Establishing strategy-Sense of community-How to measure sense of community.

**Unit II:**

**Growth:** Analyzing Your Current Levels of Growth-Using Data to Optimize Growth-Optimizing the Conversion Process. **Content:** The Best Content for a Community-Principles of Great Content-The Social Order Debate-Content Categories-Category Repetition.

**Unit III:**

Moderation: Barriers to Participation-Encouraging Participation-Conflicts and Antagonistic members-Concentrating and Dissipating Activity-Steering Community Topics/focus-Overall Goals of Moderation.

#### **Unit IV:**

Influence and Relationships: Online Communities On Physical Social Relationships- Understanding virtual community members' relationship-Events and Activities- Events Preview- List of Activities-Events review.

#### **Unit V:**

Business Integration: Online Community Integration-Types of online Community- User Experience-The Community Ecosystem- Existing Online Communities-Community management success.

#### **TEXT BOOK:**

1. Richard Millington, Buzzing Communities, Feverbee, Oct 2012,ISBN: 978-0988359901.

#### **REFERENCES**

1. Amy Jo Kim, Community Building on the Web, First Edition, Peachpit Press, 2006. ISBN: B004SHDFH6..

2. Jenny Preece, Online Communities, John Wiley & Sons, 2000, .ISBN- 978-0471805991

### **21UFC902- VALUE EDUCATION - HUMAN RIGHTS**

**CREDIT: 2**

**CONTACT HRS: 2 HRS/WEEK**

#### **SYLLABUS**

#### **UNIT – I**

#### **CONCEPT OF HUMAN VALUES, VALUE EDUCATION TOWARDS**

#### **PERSONALDEVELOPMENT**

Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education.

#### **PERSONAL DEVELOPMENT**

Self-analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to - age, experience, maturity, members of the family, neighbours, co-workers.

#### **CHARACTER FORMATION TOWARDS POSITIVE PERSONALITY**

Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance, Scientific Vision.

## **UNIT – II**

### **VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT**

#### **NATIONAL AND INTERNATIONAL VALUES**

Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Social Values - Pity and probity, self-control, universal brotherhood.

Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

Religious Values - Tolerance, wisdom, character. Aesthetic values - Love and appreciation of literature and fine arts and respect for the same. National Integration and international understanding.

## **UNIT – III**

### **IMPACT OF GLOBAL DEVELOPMENT ON ETHICS AND VALUES**

Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise. Modern Challenges of Adolescent Emotions and behaviour; Sex and spirituality: Comparison and competition; positive and negative thoughts.

Adolescent Emotions, arrogance, anger, sexual instability, selfishness, defiance.

## **UNIT IV**

### **HUMAN RIGHTS**

#### **1. Concept of Human Rights – Indian and International Perspectives**

- A. Evolution of Human Rights
- B. Definitions under Indian and International documents

#### **2. Broad classification of Human Rights and Relevant Constitutional Provisions.**

- A. Right to Life, Liberty and Dignity
- B. Right to Equality
- C. Right against Exploitation
- D. Cultural and Educational Rights
- E. Economic Rights
- F. Political Rights
- G. Social Rights



3. Human Rights of Women and Children
  - A. Social Practice and Constitutional Safeguards
  - B. Female Feticide and Infanticide
  - C. Physical assault and harassment
  - D. Domestic violence
  - E. Conditions of Working Women
4. Institutions for Implementation
  - A. Human Rights Commission
  - B. Judiciary
5. Violations and Redresses
  - A. Violation by State
  - B. Violation by Individuals
  - C. Nuclear Weapons and terrorism
  - D. Safeguards.

## **UNIT V**

### **THE INDIAN PENAL CODE**

Introduction -General Principles- Specific Offences, Punishments, Classes of Offences, Violence against women in India, New Trends in Judiciary

#### **References:**

1. “Value education /Human Rights for Under Graduate Courses”, Bharathiar University, Coimbatore.
2. “Indian Penal Code” ,1860, Padala Rama Reddi, Asia law house,2014 (16th edition).

# SEMESTER III

**21UCS301- PHYSICS FOR COMPUTER SCIENCE – I**

**CONTACT HOURS/WEEK: 02**

**SYLLABUS**

**UNIT I: Current Electricity**

Ohm's Law-Verification of Ohm's Law-Kirchoff's law-Applications of Kirchoff's law- Wheatstone's bridge - Metre bridge- Carey Foster's bridge- Potentiometer- Measurement of Current and Resistance-Calibration of low range Voltmeter.

**UNIT II: Alternating Current**

AC circuits with double components–measurement of current and voltage–power in an AC Circuit-Power Factor (derivation)-Wattless current – Choke - series and parallel resonant circuits - Impedance-Q factor-Selectivity and Sharpness of resonance.

**UNIT III Number Systems, Codes and Logic gates**

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division-8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - ASCII code – Basic and Derivative Gates: AND, OR, NOT, NAND, NOR, EX-OR - NAND & NOR as Universal Gates.

#### **UNIT IV Boolean algebra, Arithmetic and Combinational Logic Circuits**

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half-adder - Full adder - Half- Subtractor - Full subtractor (using basic gates) – Encoder - Decimal to BCD encoder- Decoder- BCD to decimal decoder.

#### **UNIT V Semiconductor Memories**

Introduction – ROM using diodes and transistors – ROM in terms of digital circuits – Building memory of larger capacity–PROM–EPROM–EEPROM–ROM as a unit in microcomputers – RAM – Static RAM – Flip – Flop as a RAM cell – Memory expansion Memory Parameters.

#### **Books for Study:**

1. Narayanamurthi and Nagarathinam, *Electricity and Magnetism*, The National Publishing Company, Madras, 1994.
2. Brijlal & Subramanian, *Electricity and Magnetism*, Ratan Prakashan Mandir, 1995.
3. Puri V.K., *Digital Electronics circuits and systems*, TATA Mcgraw hill publications, New Delhi, 2011.
4. Vijayendran. V & Subramanian. V, *Introduction to Integrated Electronics*, S. Viswanath PVT Ltd., Chennai 2012.

#### **Books for Reference:**

1. Murugesan.R, *Electricity and Magnetism*, S.Chand & Company Ltd., 2015.
2. Gothamam W.H., *Digital Electronics*, Prentice Hall of India PVT., New Delhi, 1996.

**PHYSICS LABORATORY-I**

**21UCS351- ELECTRONICS**

**Contact Hours/Week: 02 Credits: 02**

**List of Experiments (Any 12)**

1. Semi-Conductor diode -Characteristics.
2. Zener diode –Characteristics.
3. FET- Characteristics.
4. Transistor Characteristics - CEconfiguration.
5. Transistor Characteristics-CBConfiguration.
6. Metre Bridge-SpecificResistance.
7. Potentiometer-Measurement ofCurrent.
8. Potentiometer-Calibration of low rangevoltmeter.

9. Carey Foster's Bridge- Specific Resistance.
10. LCR - Series resonance circuit
11. LCR - Parallel resonance circuit
12. Mathematical Operator-Addition, Subtraction using OP-Amp.
13. Logic Gates (AND, OR, NOT, NAND, NOR and EX-OR) Using IC's.
14. NAND and NOR as Universal Gates.
15. Verification of De-Morgan's Theorems.
16. Half –Adder and Half –Subtractor using logic gates.
17. Full Adder and Full Subtractor using logic gates.
18. Single Stage Amplifier.

**Books for Study:**

1. Srinivasan M.N. Balasubramanian S. & Renganathan R., *A Text book of Practical Physics*, Sulthan Chand & Sons, New Delhi, 2000.
2. Somasundram S., *Practical Physics*, Apsara Publications, Tiruchirappalli. 2012.

**BOOKS FOR REFERENCE:**

1. Department of Physics, *Practical Physics*, (B.Sc Physics Main), St. Joseph's College, Tiruchirappalli 1998.

**21UCU405- DATA STRUCTURE AND ALGORITHMS**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I: Introduction**

Data structures – Types of Data structures –Data structure operations – Abstract data type- Analysis of algorithms – Amortized Analysis.

**Arrays:** Introduction – Characteristics of Arrays – One-dimensional Arrays – Operation with Arrays – Two-dimensional Arrays – Multi-dimensional Arrays.

**Unit II: Stacks & Queues**

Stack – Definitions – Concepts – Operations on Stacks – Infix, postfix & prefix conversions - evaluations of expressions using stack - Applications of stacks – Representation of Queue – Insertion and Deletion Operation – Applications of Queue.

### **Unit III: Lists**

Lists – Linked List – Singly linked list – doubly linked list – Circular linked list –Representation of Stacks using linked lists – Representation of Queues using linked lists– Applications of Linked list.

### **Unit IV: Sorting**

Bubble sort - Insertion sort – Selection sort – Quick sort – Merge sort – Radix sort – Heap sort.  
**Trees:** Trees – Binary Trees – Operations on Binary Trees –Traversal of a Binary Tree – Threaded Binary Tree - Binary Search Trees (BST) – Inserting and Deleting in a BST.

### **Unit V: Graphs**

Graphs – Representation of graph – Traversal in Graph – Spanning Trees - Prim’s and Kruskal’s algorithm – Dijkstra’s algorithm for shortest path problem.

#### **TEXTS:**

1. “Data structure using C”, Instructional Software Research and Development(ISRD) Group, Tata McGraw-Hill Publishing Company Limited, New Delhi, ISBN No:0-07-05559102-4.

#### **REFERENCE MATERIALS**

1. Rajib Mall, “Fundamentals of Software Engineering”, Prentice Hall India, Fifth Edition. ISBN:9789388028028
2. Ian Sommerville, “Software Engineering”, Pearson Education, Tenth Edition, 2018. ISBN-10: 9332582696
3. Watts S. Humphrey, “A Discipline For Software Engineering”, Pearson Education, Second reprint edition, 2007. ISBN-10: 8131703800
4. Shari Lawrence Pfleeger, Joanne M. Atlee, “Software Engineering: Theory and Practice”, Fourth Edition, Pearson Education,2010. ISBN-10: 9788131760628

## **21UCU406: DATABASE MANAGEMENT SYSTEMS**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

**Unit I:Relational Database:Purpose of Database System** – Views of Data – Data Models – Database System Architecture – Introduction to Relational Databases – Relational Model – Keys – Relational Algebra – Relational Calculus – SQL Fundamentals.

#### **Unit II:DatabaseDesign**

Entity-Relationship Model – ER Diagrams – Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form.

#### **Unit III:TransactionManagement**



Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels – Concurrency Control – Need for Concurrency – Lock-Based Protocols – Deadlock Handling. Recovery System – Failure Classification – Recovery Algorithm.

#### **Unit IV:ImplementationTechniques**

Overview of Physical Storage Media – RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices.

#### **Unit V:Distributed and NoSQL Database**

Overview of Distributed Databases – Data Fragmentation – Replication – XML Databases – XML Schema – NOSQL Database: Characteristics– Types of NoSQL Datastores: Column Oriented, Document, Key-Value and Graph Types – Applications – Current Trends.

#### **TEXT:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill,2015.ISBN-10: 9332901384.
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education,2017.ISBN-10: 0133970779.

## **21UCS501 - OVERVIEW OF LOGIC AND COMPUTATION**

**CREDITS:4**

**MARKS: 40 +60**

### **SYLLABUS**

#### **Unit I:**

Propositional logic: Declarative sentences - Natural deduction - Rules for natural deduction - Derived rules - Provable equivalence - Propositional logic as a formal language - The meaning of logical connectives - Mathematical induction - Soundness of propositional logic - Completeness of propositional logic - Normal forms - Semantics of propositional logic - Conjunctive normal forms and validity - Horn clauses and satisfiability - SAT solvers - A linear solver - A cubic solver.

#### **Unit II**

Predicate logic - The need for a richer language - Predicate logic as a formal language – Terms – Formulas - Free and bound variables – Substitution - Proof theory of predicate logic - Natural deduction rules – Quantifier equivalences - Semantics of predicate logic – Models - Semantic entailment - The semantics of equality - Undecidability of predicate logic - Expressiveness of predicate logic - Existential second-order logic - Universal second-order logic – Micromodels of software - State machines – Alma - A software micromodel.

### **Unit III**

Verification by model checking - Motivation for verification - Linear-time temporal logic - Syntax of LTL - Semantics of LTL - Practical patterns of specifications - Important equivalences between LTL formulas - Adequate sets of connectives for LTL - mutual exclusion - The NuSMV model checker - The ferryman - Syntax of CTL - Semantics of CTL - Practical patterns of specifications - Important equivalences between CTL formulas - Adequate sets of CTL connectives – The expressive powers of LTL and CTL - Model-checking algorithms - The fixed-point characterization of CTL.

### **Unit IV**

Program verification - A core programming language - Hoare triples - Partial and total correctness - Program variables and logical variables - Proof calculus for partial correctness - Proof rules - Proof tableaux - Proof calculus for total correctness - Modal logics and agents - Modes of truth - Basic modal logic - Logic engineering - Natural deduction - Reasoning about knowledge in a multi-agent system.

### **Unit V:**

Binary decision diagrams - Representing Boolean functions - Propositional formulas and truth tables - Binary decision diagrams - Ordered BDDs - Algorithms for reduced OBDDs - The algorithm reduce, apply, restrict, exists - Symbolic model checking - Representing subsets of the set of states - Representing the transition relation - Implementing the functions  $\text{pre}\exists$  and  $\text{pre}\forall$  - Synthesizing OBDDs - A relational mu-calculus - Syntax and semantics - Coding CTL models and specifications.

### **TEXT(S)**

1. Michal Huth and Mark Ryan, “ Logic in Computer Science” , Cambridge University Press, ISBN-13:978-0-511-26401-6, 2004.

### **REFERENCE MATERIALS**

1. Zohar Manna and Richard Waldinger“ The Logic of Computer Programming”, SRI International, 2013.
2. Ulf Nilsson and Jan MaluszynskiLogic “ Logic,Programming and Prolog”, John Wiley & Sons , 2000.

**21UCU553 - COMPUTER LABORATORY 3: DATA STRUCTURES WITH C++**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

1. Inheritance
2. Pointer
3. Virtual Function
4. Friend Functions and Static Function
5. Templates and Exception Handling
6. Stack
7. Queue
8. Searching Techniques
9. Sorting Techniques

## 10. Linked List

### **Tools Required:**

Turbo C or C++ / Eclipse / Code::Blocks / GNAT Programming Studio (GPS) / Visual Studio Code / CodeLite

### **TEXT(S)**

1. Data Structures, Seymour Lipschutz, Publisher: McGraw Hill Education; Revised First edition, 2014, ISBN-10: 1259029964, ISBN-13: 978-1259029967

### **REFERENCE**

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3<sup>rd</sup> Edition, The MIT Press; 3rd edition (July 31, 2009), ISBN-10: 9780262033848, ISBN-13: 978-0262033848
2. Data structures using C++, D.S.Malik, Publisher: Cengage; 2 edition, 2012, ISBN-10: 9788131518236 ISBN-13: 978-8131518236

### **Ability (Skill) Enhancement**

#### **21UAB383 - Soft and Quantitative Skills – III**

#### **SEMESTER III – APTITUDE ( QUANTITATIVE & REASONING)**

**UNIT I** - Logical thinking, directions - Calculation shortcuts – Multiplication made easier, Percentage calculations, squaring and cubing of numbers

**Activity** Puzzles, Who done it, practice exercise

**Evaluation** - Directions and calculation shortcuts

**UNIT II** - Number system – classification, HCF & LCM, Divisibility rule, Coding & decoding, Number series, Odd man out

**Activity**, quiz, practice exercise

**Evaluation** -Number System, Blood relations

**UNIT III** - Problems on Averages, Problems on ages, Blood relations

**Activity** -Puzzles, quiz, practice exercise

**Evaluation** - Averages, Ages, Blood Relations

**UNIT IV** -Ratio, Proportion, Variation & Mixtures

**Activity** Puzzles, quiz, practice exercise

**Evaluation** -Ratio, Proportion, Variation & Mixtures

**UNIT V** - Percentages, Profit & Loss, Discount

Simple interest & Compound Interest

**Activity** Puzzles, quiz, practice exercise

**Evaluation** -Percentage, Profit & loss, discount

**UNIT VI** - Time & Work, Pipes & Cisterns, Data Arrangement

**Activity** Puzzles, quiz, practice exercise

**Evaluation** Time & Work, Pipes & Cisterns, Data Arrangement

**UNIT VII** - Time, Speed and Distance, Problems on trains and boats

**Activity** Puzzles, quiz, practice exercise

**Evaluation** Time, Speed and distance, Problems on boats and trains

**UNIT VIII** - Data Interpretation, Syllogisms

**Activity** Puzzles, quiz, practice exercise

**Evaluation** Data Interpretation, Syllogisms

### **Reference Books**

1. Quantitative Aptitude for competitive exams by Abhijit Guha
2. Quantum Cat by Arun Sharma
3. A modern Approach to Verbal & Non Verbal Reasoning – R S Agarwal

## VALUE ADDED COURSES

### 21UCS152 - COLLOBORATIVE COMPUTING

**CREDITS:2**

**MARKS: 40 + 60**

#### **SYLLABUS**

**Unit I: Virtual Reality and Virtual Environments:** The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality.

**Unit II: Designing and Developing 3D User Interfaces:** Strategies for Designing and Developing Guidelines and Evaluation **Virtual Reality Applications:** Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.

**Unit III: Introduction of Augmented Reality (AR):.** System Structure of Augmented Reality.  
Key Technology in AR-3D Augmented Reality Interface-Agents in AR-Transitional AR-VR  
Interfaces

**Unit IV: Web Application Development:** AJAX: Traditional Web Applications vs. Ajax  
Applications, Rich Internet Applications (RIAs) with Ajax, History of Ajax, Ajax Example  
Using the XML, HttpRequest Object, Using XML and the DOM

**Unit V: Network Management:** Goals, Organization, and Functions, Network and System  
Management-Network Management System Platform, Network Management Tools- Current  
Status and future of Network Management.

**TEXT BOOK(S):**

- 1 Alan B Craig, William R Sherman and Jeffrey D Will, “Developing Virtual Reality Applications: Foundations of Effective Design”, Morgan Kaufmann, 2009,ISBN: B002ZJSW4K.
2. John Vince, “Virtual Reality Systems”, Pearson Education ,ISBN: 978-81317084463.
3. Mani Subrahmanian, “Network Management Principles and Practice”,2nd Edition, Pearson Education, 2010, ISBN: 8131727599.
4. Thomas A Powel, “The Complete Reference: AJAX”, 1stEdition, Tata McGraw Hill, 2008, , ISBN: 9780072224429

**REFERENCE BOOK(S):**

- 1.Alan B Craig, “Understanding Augmented Reality”, Morgan Kaufmann, First Edition 2013, ISBN: 978-0240824086
2. Mark Burgess, “Principles of Network and System Administration”, Wiley,Second Edition 2008,ISBN: 978-8126504985

**21UFE903: ELECTIVE FOUNDATION-I: GENERAL AWARENESS**

**Credits: 2**

**Contact Hrs: 2hrs/week**

**SYLLABUS**

**UNIT-I**

**TAMIL AND OTHER LITERATURES**

Tamil, English, Religious Literatures – Ancient Literature – Bakthi Literature –Medieval Literature – Modern Literature (Novel, Short Stories, Modern Poetry).

**SOCIAL AND WOMEN RELATED STUDIES**



Concept and need for Women Studies – Scope- Women Movements-Pre-Independent-Post Independent-Current Women Movements-National Committees for Women – Government Organization for Women Development.

## **EDUCATION**

Development Process of the Learner – Principles of Development (Physical, Social, Emotional and Intellectual) – Learning Process – Teaching and Teacher Behavior –Interaction Concept of Mental Health – Counseling, Guidance – Tutorward – Communication Skills.

## **UNIT-II**

### **NUMERICAL APTITUDE**

Objective Arithmetic: Number System – Probability – HCF and LCM of numbers – decimal fractions – Simplification – Square Roots and Cube Roots - Average – Percentage – Profit and Loss – Ratio and proportion – Time and work – Simple interest area volume and surface area.

### **VERBAL APTITUDE**

Spot the odd one out – Correct form of verb – Preposition –Find out the rightly spelt word, – Choose the correct meaning of idioms – Synonyms and Antonyms.

### **ABSTRACT REASONING**

Logical Deduction: Logic – Statement – Arguments – Statement Assumptions – Statement Course of Action.

Non-Verbal Reasoning: Series – Analogy – Classification – Analytical Reasoning – Mirror Images– Paper Folding – Paper Cutting - Rule Detection – Grouping of identical figures.

## **UNIT-III**

### **GENERAL SCIENCE AND TECHNOLOGY:SCIENCE**

Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

### **TECHNOLOGY**

Discoveries and Inventions of Modern Techniques.

### **COMPUTER SCIENCE**

Historical Evolution of Computers–Computer Applications–Data Processing Concepts–Computer Codes and Arithmetic–Hardware Components–Data Structures.

## **UNIT-IV**

### **ECONOMICS**

Basic Economics – Demand-Supply- Pricing-GDP- National Income-Types of Industries-Management.

## **COMMERCE**

Banking - Retailing-Insurance - Transport and Communications - Business Process Outsourcing - Tourism and Hospitality Industry - Capital Market - Foreign Trade.

## **CURRENT AFFAIRS**

State, Central and International affairs: Budgets – Politics – Sports - Education – Commerce and Industry – Inventions – Social and Technology – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

## **UNIT-V**

### **SPORTS AND GAMES**

Athletics – Track field events – Games – Indoor Games – Outdoor Games –Sports, Olympics & Asian games – First Aid.

### **NATIONAL SERVICE SCHEME (NSS) & NATIONAL CADET CORPS (NCC)**

History of NSS ; Motto, Symbol and Badge – Aims and Objectives – Duties and Total Hours – Organizational and Administrative setup – History of Voluntary Organization, – Regular activities – Special camp activities – Special programmes – Awards – Important days- NSS Song.

Introduction to the Armed Forces (Army, Navy, Air Force)-Drills-Weapon Training-Map Reading –Certificate based Examination-Civil Defense.

### **YOUTH RED CROSS (YRC)**

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main Objectives of YRC - Emblem – Fundamental Principles of Red Cross – Organizational setup - Activities of Youth Red Cross - Role of different functionaries

Training programmes for YRC Program Officers – Training programming for YRC Volunteers – YRC song - Working hours – General orientation – Special orientation – Program skill Learning.

### **References:**

1. **“General Awareness for Under Graduate Courses”**, Bharathiar University, Coimbatore.
2. **“A Modern Approach to Verbal and Non Verbal Reasoning”**, Dr.R.S.Aggarwal, Reprint-2012. Chand & company LTD.
3. **“Quantitative Aptitude”**, Dr.R.S.Aggarwal, reprint -2012. S.Chand & Company LTD.
4. [WWW.allexamgurublog.com](http://WWW.allexamgurublog.com)
5. Gkquiz.com

6. Commerceprofessor.blogspot.com

7. Scholarexpress.com

## **21UFE904: CONSTITUTION OF INDIA**

**Credits: 2**

**Contact Hrs: 2hrs/week**

### **SYLLABUS**

#### **UNIT I**

Making of Constitution - Constituent Assembly - Dr.RajendraPrasath - Dr.B.R.Ambedkar  
- Salient features - Fundamental Rights.

#### **UNIT II**

Union Executive - President of India - Vice-President - Prime Minister - Cabinet -  
Functions

### **UNIT III**

Union Legislature - RajiyaSabha - LokSabha - Functions and Powers

### **UNIT IV**

Union Judiciary - Supreme Court - Functions - Rule of law

### **UNIT V**

State - Executive - Legislature - Judiciary

### **Books for Reference:**

1. Agharwal.R.C. - National Moment and Constitutional Development - New Delhi, 1977
2. Chapra B.R., Constitution of India, New Delhi, 1970
3. Rao B.V., Modern Indian Constitution, Hyderabad, 1975.
4. NaniPalkhivala - Constitution of India, New Delhi, 1970
5. Krishna Iyer, V.R., Law and Justice, New Delhi, 2009

# SEMESTER – IV

**SUPPORTIVE/ALLIED: PHYSICS THEORY 2 – PHYSICS FOR COMPUTER**

**SCIENCE –II**

**MICROPROCESSOR – 21UCS302**

**CREDITS:2**

**CONTACT HOURS:2**

**SYLLABUS**

## **UNIT – I MICROPROCESSOR ARCHITECTURE**

Intel 8086 Architecture – Intel 8086 Architecture – Bus cycles and timing diagram – 8086 instruction and data formats – Addressing modes – Instruction executing time –Instructions affecting flags

## **UNIT II INSTRUCTION SET OF 8086**

8086 instructions – Data transfer instruction – Arithmetic instructions – Logical instructions- Branch –String manipulation instructions –Control transfer instructions –Examples -Interrupts of 8086.

## **UNIT – III ASSEMBLY LANGUAGE PROGRAMS**

Addition of two 16-bit numbers – 16-bit subtraction – Decimal addition – To find the **largest** number and smallest number in a data array – Sum of array of numbers – Multiplication – Division – Multi byte addition

## **UNIT – IV PERIPHERAL DEVICES AND INTERFACING**

I/O Ports – Programmable Peripheral Interface (IC 8255) – Architecture – control word – Programmable Communication interface (IC 8251) – Programmable Counter/Timer (IC 8253) – Microprocessor based data acquisition system- Interfacing of A/D converter – Interfacing of D/A converter.

## **UNIT – V INTEL 80X86 FAMILY OF PROCESSORS**

Pins and signals and architecture of INTEL 80186, INTEL 80286, INTEL 80386, INTEL 80486 microprocessors – Pins, signals and architecture of Pentium microprocessor –Advanced Pentium processors

### **Text Book:**

1. A. Nagore Kani, Microprocessors and Microcontrollers, Tata McGraw Hill Publishing India Pvt Ltd, 2<sup>nd</sup> edition, 2012.

### **Reference Books:**

1. Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, (Prentice Hall, 2002).

**SUPPORTIVE/ALLIED : LABORATORY - 1 : 21UCS352 : MICROPROCESSOR**

**Contact Hours/Week: 02**

**Credits: 02**

**List of Experiments:**

1. 8086 Microprocessor – 16 bit addition
2. 8086 Microprocessor –Subtract two 16-bit data.
3. 8086 Microprocessor – Multibyte subtraction
4. 8086 Microprocessor –Sum of elements in an array
5. 8086 Microprocessor – BCD Addition
6. 8086 Microprocessor –BCD Subtraction

7. 8086 Microprocessor – Division of 32-bit data by 16-bit data
8. 8086 Microprocessor –Search for smallest data in an array
9. 8086 Microprocessor –Search for largest data in an array
10. 8086 Microprocessor –Sorting array in ascending order
11. 8086 Microprocessor –Sorting array in descending order
12. 8086 Microprocessor–GCD of two 16-bit data
13. 8086 Microprocessor –LCM of two 16-bit data
14. PN junction Diodes

**Reference Book:**

1. A. Nagoor Kani, Microprocessors and Microcontrollers, Tata McGraw Hill Education Pvt Ltd, 2<sup>nd</sup> edition, 2008.

**21UCU407 - COMPUTER NETWORKS AND DATA COMMUNICATION**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I:** Introduction: Data Communications and Networking for Today's Enterprise - A Communications Model - Data Communications - Networks - The Internet. The Need for a Protocol Architecture - The TCP/IP Protocol Architecture - The OSI Model - Standardization within a Protocol Architecture - Traditional Internet-Based Applications – Multimedia.



**Unit II:** Data Transmission: Concepts and Terminology - Analog and Digital Data Transmission - Transmission Impairments - Channel Capacity. Transmission Media: Guided Transmission Media -- Wireless Transmission - Wireless Propagation - Line-of-Sight Transmission.

**Unit III:** Signal Encoding Techniques: Digital Data, Digital Signals - Digital Data, Analog Signals - Analog Data, Digital Signals - Analog Data, Analog Signals. Digital Data Communication Techniques: Asynchronous and Synchronous Transmission - Types of Errors - Error Detection - Error Correction - Line Configurations.

**Unit IV:** Asynchronous Transfer Mode: Protocol Architecture - ATM Logical Connections - ATM Cells - Transmission of ATM Cells - ATM Service Categories. Congestion Control in Data Networks: Effects of Congestion - Congestion Control - Traffic Management - Congestion Control in Packet-Switching Networks - Frame Relay Congestion Control - ATM Traffic Management - ATM-GFR Traffic Management.

**Unit V:** Internet Protocols: Basic Protocol Functions - Principles of Internetworking - Internet Protocol Operation - Internet Protocol - IPv6 - Virtual Private Networks and IP Security. Transport Protocols: Connection-Oriented Transport Protocol Mechanisms - TCP - TCP Congestion Control -UDP 693.

**TEXT(S)**

1. Data and Computer Communications, Tenth Edition, William Stallings, Pearson Prentice Hall, 2014, ISBN 10: 0-13-350648-7, ISBN 13: 978-0-13-350648-8

**REFERENCE(S)**

1. Computer Networks, Andrew S Tanenbaum and David J. Wetherall, Fifth Edition, Pearson Publisher, 2010, ISBN-13: 978-0-13-212695-3.
2. Data communication and Networking, Behrouz A Forouzan, McGraw-Hill, Fifth Edition, New York, 2012. ISBN: 0073376221

## **21UCU408, SOFTWARE ENGINEERING**

**CREDITS:4**

**Marks: 40 + 60**

### **SYLLABUS**

**Unit I:Product and Process:** The Nature of Software – The changing nature of Software – The Software Process – Process models –The Waterfall Model– Incremental Process Model– Evolutionary Process Models–The Unified Process- Agile Development – Extreme Programming (XP)- Adaptive Software Development(ASD)- Scrum-Crystal-Feature Driven Development(FDD)-Agile Modeling.

**Unit II:Requirements Analysis and Specification:** Requirements Analysis – Software Requirements – Requirements Engineering – Eliciting Requirements – Developing Use Cases – Building the Requirements Model – Negotiating and Validating Requirements.

**Unit III:Analysis and Design:** Requirements Modeling: Scenarios, Information, Analysis Classes – Scenario Based Modeling – Data Modeling – Class-Based Modeling – Flow Oriented Models – Behavioral Models. Design Process and Concepts: Design Model: Data Design Elements – Architectural Design.

**Unit IV:Software Testing:** Software Testing Strategies – System Testing – Debugging – White Box Testing – Black Box Testing – Model Based Testing –Testing Object-Oriented and Web Based Applications – User Interface Testing – Configuration Testing – Security Testing – Performance Testing.

**Unit V:Software Project Management:** Software Project Management Concepts – Process and Project Metrics – Estimation for Software Projects – Project Scheduling – Risk Management – Software Configuration Management – Software Process Improvements (SPI) – The SPI Process – Capability Machine Model Integration (CMMI) – Other SPI Frameworks.

**TEXT(S)**

Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, McGraw Hill International Edition, Eighth Edition, 2019.ISBN-10: 9353165717.

**REFERENCE MATERIALS**

1. Rajib Mall, “Fundamentals of Software Engineering”, Prentice Hall India, Fifth Edition. ISBN:9789388028028
  2. Ian Sommerville, “Software Engineering”, Pearson Education, Tenth Edition, 2018. ISBN-10: 9332582696
  3. Watts S. Humphrey, “A Discipline For Software Engineering”, Pearson Education, Second reprint edition, 2007. ISBN-10: 8131703800
- Shari Lawrence Pfleeger, Joanne M. Atlee, “Software Engineering: Theory and Practice”,

**21UCU554 - COMPUTING LABORATORY 4 – GO PROGRAMMING**

**CREDITS:2**

**MARKS: 40 + 60**

**SYLLABUS**

**COMPUTING LABORATORY - 4 :: GO PROGRAMMING**

1. Basic data types
2. Strings and Constants
3. Composite data types
4. Working with Arrays
5. Function Declaration
6. Method Declaration

7. Command-Line Arguments
8. Packages and Files
9. Recursive Functions
- 10. Function Values**

**REFERENCE URL:**

<http://vlabs.iitkgp.ac.in/vlt/project.html>

**TEXT(S)**

An Introduction To Programming In Go Copyright © 2012 By Caleb Doxsey  
ISBN: 978-1478355823- O'Reilly Publications

**21UCS801- HIGH PERFORMANCE COMPUTING**

**CREDITS:4**

**marks: 40 +60**

**SYLLABUS**

**Unit I:**Fundamentals of Quantitative Design and Analysis- Introduction- Classes of Computers- Defining Computer Architecture- Trends in Technology-Trends in Power and Energy in Integrated Circuits-Trends in Cost-Dependability-Measuring, Reporting, and Summarizing Performance.

**Unit II:** Memory Hierarchy Design- Introduction- Memory Technology and Optimizations- Ten Advanced Optimizations of Cache Performance- Virtual Memory and Virtual Machines.

**Unit III:** Instruction-Level Parallelism and Its Exploitation-Instruction-Level Parallelism: Concepts and Challenges-Basic Compiler Techniques for Exposing ILP-Reducing Branch Costs With Advanced Branch Prediction-Overcoming Data Hazards With Dynamic Scheduling-Dynamic Scheduling: Examples and the Algorithm-Hardware-Based Speculation.

**Unit IV:** Data-Level Parallelism in Vector, SIMD, and GPU Architectures-Introduction-Vector Architecture-SIMD Instruction Set Extensions for Multimedia-Graphics Processing Units-Detecting and Enhancing Loop-Level Parallelism-Cross-Cutting Issues.

**Unit V:** Thread-Level Parallelism-Introduction-Centralized Shared-Memory Architectures-Performance of Symmetric Shared-Memory Multiprocessors- Synchronization: The Basics-Models of Memory Consistency: An Introduction- Cross-Cutting Issues.

**TEXT(S)**

1. Computer Architecture-A Quantitative Approach by Thomas Sterling Maciej Brodowicz Matthew Anderson. Paperback ISBN: 9780124201583. eBook ISBN: 9780124202153

**REFERENCE MATERIALS**

1. High Performance Computing: Modern Systems and Practices,by [Maciej Brodowicz](#), [Thomas Sterling](#), [Matthew Anderson](#)

**21UCS804 - SOFTWARE PROJECT MANAGEMENT>**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**UNIT I: PROJECT EVALUATION AND PROJECT PLANNING**

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting Objectives – Management Principles – Management Control – Project Portfolio Management – Cost-Benefit Evaluation Technology – Risk Evaluation – Strategic Program Management – Stepwise Project Planning.

## **UNIT II : PROJECT LIFE CYCLE AND EFFORT ESTIMATION**

Software Process and Process Models – Choice Of Process Models – Mental Delivery – Rapid Application Development – Agile Methods – Extreme Programming – SCRUM – Managing Interactive Processes – Basics Of Software Estimation – Effort And Cost Estimation Techniques – COSMIC Full Function Points – COCOMO II A Parametric Productivity Model – Staffing Pattern.

## **UNIT III: ACTIVITY PLANNING AND RISK MANAGEMENT**

Objectives of Activity Planning – Project Schedules – Activities – Sequencing And Scheduling – Network Planning Models – Forward Pass & Backward Pass Techniques – Critical Path (CRM) Method – Risk Identification – Assessment – Monitoring – PERT Technique – Monte Carlo Simulation – Resource Allocation – Creation Of Critical Patterns – Cost Schedules.

## **UNIT IV : PROJECT MANAGEMENT AND CONTROL**

Framework For Management and Control – Collection Of Data Project Termination – Visualizing Progress – Cost Monitoring – Earned Value Analysis- Project Tracking – Change Control- Software Configuration Management – Managing Contracts – Contract Management.

## **UNIT V: STAFFING IN SOFTWARE PROJECTS**

Managing People – Organizational Behavior – Best Methods Of Staff Selection – Motivation – The Oldham-Hackman Job Characteristic Model – Ethical And Programmed Concerns – Working In Teams – Decision Making – Team Structures – Virtual Teams – Communications Genres – Communication Plans.

## **TEXTS**

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management, McGraw Hill Education; 5 edition (1 July 2017), ISBN-10: 0071072748, ISBN-13: 978-0071072748

## **REFERENCE BOOK(s):**

1. A Kelkar, "Software Project Management A Concise Study", Third Edition, 2012, PHI Learning, ISBN-10: 8120347021, ISBN-13: 978-8120347021.

**21UCU807- DATA SCIENCE**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I:** Introduction- The Data Science Road Map: Frame the Problem- Understand the Data – Model – Programming Languages: A Survey of Programming Languages for Data Science – Strings - Defining Functions – Python – Data Munging: Problems with Data Content - Problems with Data Content - Regular Expressions.



**Unit II:** Visualizations and Simple Metrics: Pie Charts, Bar Charts, Histograms - Means, Standard Deviations, Medians, and Quantiles – Box plots , Scatter plots - Heat maps - Correlations - Time Series - Machine Learning Overview: Historical Context - Supervised versus Unsupervised - Training Data, Testing Data, and the Great Boogeyman of Overfitting. Machine Learning Classification : Classifiers - Evaluating Classifiers.

**Unit III:** Unsupervised Learning: The Curse of Dimensionality - Component Analysis - Factor Analysis – Clustering – Regression - Least Squares – Correlation - Linear Regression - LASSO Regression and Feature Selection - Data Encodings and File Formats

**Unit IV:** Big Data – Hadoop File System - Spark Overview - Spark Operations – PySpark – MapReduce – Databases: Relational Databases and MySQL – MongoDB - Software Engineering Best Practices: Coding Style - Version Control and Git for Data Scientists - Testing Code - Test-Driven Development - AGILE Methodology – Natural Language Processing.

**Unit V:** Time Series Analysis - Probability: The Uniform Distribution and Pseudorandom Numbers – Non discrete, Non continuous Random Variables - Notation, Expectations, and Standard Deviation - Dependence, Marginal and Conditional Probability - Binomial , Poisson , Normal , Exponential , Log-Normal Distribution – Entropy – Statistics: Statistics in Perspective - Hypothesis Testing - Bayesian Statistics - Stochastic Modeling: Markov Chains - The Viterbi Algorithm - Continuous-Time Markov Processes, Poisson Processes.

#### **TEXT(S)**

1. Field Cady, “ The Data Science Handbook”, John Wiley & Sons, ISBN:9781119092919, 2017.

#### **REFERENCE MATERIALS**

1. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontline" by Schroff /O'Reilly, 2013.

2. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.

3. John W. Foreman, "Data Smart: Using data Science to Transform Information into Insight" by John Wiley & Sons, 2013.

**21UCU810 - CLOUD MANAGEMENT**

**CREDITS:4**

**MARKS: 40 + 60**

**SYLLABUS**

**Unit I: To Grasp the Cloud- Fundamental concepts:** The True Nature of the Cloud – Virtualization and Scalability – The Cloud Hypervisor – Key benefits of implementing Hypervisors – Foundations of Cloud computing.

**Unit II: Cloud Management:** Understanding Cloud Management Platforms – Service level agreements – Policies and procedures – Managing Cloud workloads – Securing data in the cloud – Managing devices.

**Unit III: Cloud delivery and Hosting models:** Private – Public – Hybrid – Community – On-premises vs. off-premises hosting – Accountability and Responsibility based on Delivery models – Security differences between models – Functionality and Performance validation.

**Unit IV: Practical Cloud Knowledge: Install, Configure and Manage:** Setting up the Cloud – Virtual Resource Migration – Virtual components of the Cloud.

**Unit V: Storage Provisioning and Networking:** Cloud storage concepts –Cloud vs SAN storage – Cloud provisioning – Cloud storage technology – Cloud storage Gateway – Cloud security and privacy.

**TEXT(S)**

1. Abdul salam, Zafar Gilani, “Deploying and Managing a Cloud Infrastructure”, ISBN-13: 978-1118875100, ISBN-10: 9781118875100

**REFERENCE BOOKS**

1. Frank Dagenhardt , Jose Moreno, Bill Dufresne, “Deploying ACI: The complete guide to planning, configuring, and managing Application Centric Infrastructure”, 1st Edition,

**21UAB384: ABILITY (SKILL) ENHANCEMENT**

**SEMESTER IV( COMMUNICATION, APTITUDE & TECHNICAL)**

**UNIT I - RESUME BUILDING** -Reading Comprehension , Vocabulary – Synonyms & Antonyms

**Activity** Resume Preparation , Practice exercise

**Evaluation - Resume, Reading comprehension , Vocabulary test**

**UNIT II -** Permutation & Combination, Visual Reasoning, Data Sufficiency

**Activity** Practice exercise, Puzzles

**Evaluation -Permutation & Combination, Visual Reasoning, Data Sufficiency**

**UNIT III –**Probability, Critical Reasoning, Sentence correction

**Activity -**Practice exercise

**Evaluation -Probability, Critical reasoning, Sentence correction**

**UNIT IV-** Quants Overall Revision 1

**Activity -** Question Paper test & discussion

**Evaluation - Quantitative Aptitude Overall topics test**

**UNIT V -**Reasoning Overall Revision I, Group Discussion

**Activity** Question Paper test & discussion, Mock GD

**Evaluation Reasoning Overall topics test**

**UNIT VI -**Verbal Overall Revision , Technical Paper discussion 1 – C, C++

**Activity** Question Paper test & discussion, practice exercise

**Evaluation Verbal & Technical**

**UNIT VII -**Quants Overall Discussion II, Interview skills

**Activity** Question Paper test & discussion, Mock Interview

**Evaluation Quantitative aptitude test , Mock Interview**

**UNIT VIII**

**MOCK DRIVE WITH ANALYSIS & FEEDBACK – Online Test (Aptitude), GD,HR**

1. Grammar - Wren and Martin

2. Word Power made easy by Norman Lewis
3. Quantitative Aptitude for competitive exams by Abhijit Guha
4. Quantum Cat by Arun Sharma
5. A modern Approach to Verbal & Non Verbal Reasoning – R S Agarwal

**21UCS153- COMPUTER SUPPORTED COLLABORATIVE LEARNING**  
**CREDITS:2** **MARKS: 40 + 60**

## **SYLLABUS**

**Unit I: Design, Ideation, and Learning** -Course Intro & History of the Field-Network Analysis of the Community

**Unit II: Research on Learning in MOOCs**-Brief Survey on MOOCs-Learning Analytics in MOOCs

**Unit III: Design, Ideation, and Learning**- Design Methods- Idea Thread Mapper.

**Unit IV: Theoretical and Methodological Foundations**- Cognitivist Perspectives- Metacognitive and Motivational Perspectives- Agent Based support for ideation- Socio Cultural Approaches- Intro to Collaborative Process Analysis

**Unit V: Project Proposals**- Conceptual Foundation- Facilitated Group Learning Teacher Support

### **TEXT BOOK(S):**

1.Hmelo-Silver, C., Chinn, C., Chan, C., & O'Donnell, “ The International Handbook of Collaborative Learning”, Routledge, First Edition, 2013,ISBN: 978-0415805735.

### **REFERENCE BOOK(S):**

1.Claire O'Malley, “Computer Supported Collaborative Learning”, Morgan Kaufmann, Springer, First Edition, ISBN: 978-3642851001

2. Frank Fischer, “Scripting Computer Supported Collaborative Learning”, Springer, First Edition,ISBN: 978-1441942364

## **21UFE907: YOGA FOR HUMAN EXCELLENCE**

**CREDITS:2**

**CONTACT HOURS:2**

### **UNIT - I**

Yoga and Physical Health:1.1 Physical Structure - Three bodies - Five limitations 1.2 Simplified physical Exercises- Hand Exercises- Leg Exercises- Breathing Exercises- Eye Exercises- Kapalpathi 1.3 Matrarasanas L-2-Massages- Acu-puncture- Relaxation 1.4 Yogasanas- Padmasana- Vajrasanas- Chakrasanas (Side)- Viruchasanas- Yoga muthra- Patchimothasanas - Ustrasanas-Vakkarasanas- Isalabasanas

### **UNIT- II**

Art of Nurturing the life force and Mind:2.1 Maintaining the youthfulness- Postponing the ageing process 2.2 Sex and Spirituality - Significance of sexual vital fluid - Married life - Chastity 2.3 Ten stages of Mind 2.4 Mental frequency - Methods for concentration

### **UNIT - III**

Sublimation 3.1 Purpose and Philosophy of life 3.2 Intospection - Analysis of Thought 3.3 Moralization of Desires 3.4 Neutralization of Anger

### **UNIT- IV**

Human Resources development: 4.1 Eradication of worries 4.2 Benefits of Blessings 4.3. Greatness of Friendship 4.4 Individual Peace and World Peace

### **UNIT - V**

Law of Nature: 5.1 Unified force - Cause and Affect system 5.2 Purity of Thought and Deed and Genetic centre 5:3 Love and Compassion 5.4 Cultural Education - Fivefold Culture

### **BOOK PRESCRIBED:**

"MANAVALAKALAI YOGA" Year of Publication First Edition:2008, VEDHATHRI PUBLICATIONS

## **21UFE908: WOMEN'S RIGHTS**

**CREDITS:2**

**CONTACT HOURS:2**

## **UNIT I**

### **Laws, Legal Systems and Change**

Definition - Constitutional law, CEDAW and International Human Rights – Laws and Norms – Laws and Social Context – Constitutional and Legal Framework.

## **UNIT II**

### **Politics of land and gender in India**

Introduction – Faces of Poverty – Land as Productive Resources – Locating Identities – Women’s Claims to Land – Right to Property - Case Studies.

## **UNIT III**

### **Women’s Rights: Access to Justice**

Introduction – Criminal Law – Crime Against Women – Domestic Violence –Dowry Related Harassment and Dowry Deaths – Molestation – Sexual Abuse and Rape – Loopholes in Practice – Law Enforcement Agency.

## **UNIT IV**

### **Women’s Rights**

Violence Against Women – Domestic Violence - The Protection of Women from Domestic Violence Act, 2005 - The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856 - The Dowry Prohibition Act, 1961

## **UNIT V**

### **Special Women Welfare Laws**

Sexual Harassment at Work Places – Rape and Indecent Representation – The Indecent Representation (Prohibition) Act, 1986 - Immoral Trafficking – The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment - Role of Rape Crisis Centers.

## **REFERENCES**

- NityaRao “Good Women do not Inherit Land” Social Science Press and Orient Blackswan 2008
- International Solidarity Network “Knowing Our Rights” An imprint of Kali for Women 2006
- P.D.Kaushik “Women Rights” Bookwell Publication 2007



# SEMESTER - V

**21UCS502, THEORY OF COMPUTATION**

**CREDITS:4**

**MARKS: 40 +60**

## SYLLABUS

### UNIT I

**FINITE AUTOMATA:** Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Non deterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output and Inter conversion.

### UNIT II

**REGULAR EXPRESSIONS:** Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. **REGULAR GRAMMARS:** Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.

### UNIT III

**CONTEXT FREE GRAMMER (CFG):** Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL.

### UNIT IV

**PUSHDOWN AUTOMATA:** Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. **TURING MACHINES (TM):** Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of TMs.

### UNIT V

**RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL):** Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

**TEXT(S)**

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman ,“ Introduction to Automata Theory Languages and Computation”, 3<sup>rd</sup> Edition, Pearson Education, India, 2007.

**REFERENCE MATERIALS**

1. K. L. P Mishra, N. Chandrashekar, “ Theory of Computer Science-Automata Languages and Computation “, 2nd edition, Prentice Hall of India, India, 2003.

2. Zohar Manna and Richard Waldinger “ The Logic of Computer Programming”, SRI International, 2013.

**21UCS505 - INTRODUCTION TO ARTIFICIAL INTELLIGENCE**

**CREDITS:4**

**MARKS: 40 +60**

## **SYLLABUS**

**Unit I:** Artificial Intelligence-Introduction-What Is AI?- The History of Artificial Intelligence- Intelligent Agents-Agents and Environments - Good Behavior-The Concept of Rationality –The Nature of Environments – The Structure of Agents.

**Unit II:** Knowledge, reasoning, and planning- Logical Agents- Knowledge-Based Agents- Logic- Propositional Logic: A Very Simple Logic- First-Order Logic- Syntax and Semantics of First-Order Logic- Knowledge Engineering in First-Order Logic- Inference in First-Order Logic- Forward Chaining- Backward Chaining.

**Unit III:** Classical Planning- Definition of Classical Planning- Algorithms for Planning as State-Space Search- Planning Graphs- Other Classical Planning Approaches- Analysis of Planning Approaches.

**Unit IV:** Knowledge Representation - Ontological Engineering- Categories and Objects- Events- Mental Events and Mental Objects- Reasoning Systems for Categories- Reasoning with Default Information- The Internet Shopping World.

**Unit V:** Robotics- Introduction- Robot Hardware- Robotic Perception- Planning to Move- Planning Uncertain Movements- Moving- Robotic Software Architectures- Application Domains

### **TEXT(S)**

1. “Artificial Intelligence-A Modern Approach”,Third Edition by Stuart J. Russell and Peter Norvig. Published by Pearson Education, Inc.,Upper Saddle River, New Jersey 07458. ISBN-13: 978-0-13-604259-4

### **REFERENCE MATERIALS**

1. Artificial Intelligence for Robotics” by Francis X. Govers Published by Packt Publishing Ltd., ISBN 978-1-78883-544-2

## 21UCU701 - SOCIAL COMPUTING

CREDITS:4

MARKS: 40 + 60

### SYLLABUS

**Unit I: Mining Twitter:** twitter in all the rage – Exploring Twitter’s API , Analyzing the 140 characters. **Mining Facebook:** Exploring Facebook’s social Graph API – Analyzing social graph connections. **Mining Google+:** Exploring the Google+ API. **Mining web pages:** Scraping, Parsing and crawling the Web.

**Unit II: Analyzing the social web:** Nodes, Edges and Network Measures, Basics of network structure, Representing networks, Basic Network structures and properties – Network Structure and Measures, Describing nodes and edges, Describing networks. Entity Resolution and Link Prediction.

**Unit III: Community Maintained Resources:** Supporting technologies for community maintained resources, User motivations-Location based social interaction , location technology, mobile location sharing- Social Information Sharing and social filtering, Automated recommender system – Social Media in the public sector, Analyzing public sector social media.

**Unit IV: Random walks in social networks and their applications a survey:** Random walks on Graphs - Background – **Related work:** Algorithms , Applications , Evaluation and datasets. **A survey of link prediction in social networks:** Feature based link prediction, Bayesian probabilistic models. **Privacy in social networks:** Privacy breaches in social networks.

**Unit V:Visualizing social networks:** A Taxonomy of visualizations – The convergence of Visualization, Interaction and Analytics. Data mining in social media – Text mining in social networks – Integrating sensors and social networks – Multimedia information networks

### TEXT BOOK(S):

1. Matthew A. Russell, "Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, Github, and More," 2nd Edition, O'Reilly Media, 2013, ISBN: 978-94-007-0257-8.
2. Jennifer Golbeck, "Analyzing the social web," Morgan Kaufmann, 2013. ISBN: 978-0-12-405531-5

3. Charu Aggarwal (ed.), "Social Network Data Analytics," Springer, 2011. ISBN 978-1-4419-8462-3

**REFERENCE BOOK(S):**

1. Tina Yesayan, "Social Networking: A Guide to Strengthening Civil Society Through Social Media(SMGuide4CSO)," U S Agency for International Development, 2014. ISBN: ISBN: 978-1853399084.
2. Subhasish Dasgupta, "Social Computing: Concepts, Methodologies, Tools, and Applications," Information Science Reference, Hershey, New York, 2010, ISBN: 9781605669847
3. Todd Kelsey, "Social Networking Spaces: From Facebook to Twitter and Everything in Between," Apress the experts voice, 2010, ISBN: 978-1-4302-2597-3.
4. Davina Rungen, "Web 2.0 and Social Computing," Lambert Academic Publishing, 2011. ISBN: 978-384543224

## **21UCU702- INTRODUCTION TO INTERNET OF THINGS (IOT)**

**CREDITS:4**

**CONTACT HRS/WEEK : 4**

### **SYLLABUS**

**Unit I:** Evolution and Progression of Internet of Things –Genesis of IoT, IoT and Digitization. Enabling Technologies –IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models –Simplified IoT Architecture and Core IoT Functional Stack –Fog, Edge and Cloud in IoT –Functional blocks of an IoT ecosystem –Sensors, Actuators, Smart Objects and Connecting Smart Objects.

**Unit II:** IoT PROTOCOLS:IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN –Network Layer: IP versions, Constrained Nodes and Constrained Networks –Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks –Application Transport Methods: Supervisory Control and Data Acquisition –Application Layer Protocols: CoAP and MQTT .

**Unit III:** DESIGN AND DEVELOPMENT:Design Methodology -Embedded computing logic - Microcontroller, System on Chips -IoT system building blocks -Arduino -Board details, IDE programming -Raspberry Pi -Interfaces and Raspberry Pi with Python Programming.

**Unit IV:** DATA ANALYTICS AND SUPPORTING SERVICES :Structured Vs Unstructured Data and Data in Motion Vs Data in Rest –Role of Machine Learning –No SQL Databases –Hadoop Ecosystem –Apache Kafka, Apache Spark –Edge Streaming Analytics and Network Analytics –Xively Cloud for IoT, Python Web Application Framework –Django –AWS for IoT –System Management with NETCONF-YANG

**Unit V:** CASE STUDIES/INDUSTRIAL APPLICATIONS:Cisco IoT system -IBM Watson IoT platform –Manufacturing -Converged Plantwide Ethernet Model (CPwE) –Power Utility Industry –GridBlocks Reference Model -Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

## **TEXT(S)**

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Designing the Internet of Things, Book by Adrian McEwen and Hakim Cassimally

## **REFERENCE MATERIALS**

1. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things –Key applications and Protocols, Wiley, 2012 (for Unit 2).
2. Jan Höller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.
4. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.
5. Arshdeep Bahga, Vijay Madisetti, —Internet of Things –A hands-on approach, Universities Press, 2015



**21UCU703- INTRODUCTION TO OPEN SOURCE SOFTWARE AND OPEN  
STANDARDS**

**CREDITS:4**

**CONTACT HRS/WEEK : 4**

**SYLLABUS**

**UNIT I:**Open Source Licensing, Contract, and Copyright Law:Basic Principles of Copyright Law Contract and Copyright - Open Source Software Licensing - Issues with Copyrights and Patents -The Open Source Definition - Warranties The MIT, BSD, Apache, and Academic Free Licenses: The MIT (or X) License - The BSD License - The Apache License, v1.1 and v2.0 - The Academic Free License - Application and Philosophy.

**UNIT II:** The GPL, LGPL, and Mozilla Licenses: GNU General Public License - GNU Lesser General Public License - The Mozilla Public License 1.1 (MPL 1.1) - Application and Philosophy

**UNIT III:** Qt, Artistic, and Creative Commons Licenses: The Q Public License - Artistic License(Perl) - Creative Commons Licenses - Non-Open Source Licenses: Classic Proprietary License - Sun Community Source License - Microsoft Shared Source Initiative.

**UNIT IV:** Legal Impacts of Open Source and Free Software Licensing: Entering Contracts - Statutory Developments Related to Software Contracts - The Self-Enforcing Nature of Open Source and Free Software Licenses - The Global Scope of Open Source and Free Software Licensing - The “Negative Effects” of Open Source and Free Software Licensing - Community Enforcement of Open Source and Free Software Licenses.

**UNIT V:** Compatible and Incompatible Licensing: Multiple and Cross Licensing - Software Development Using Open Source and Free Software Licenses - Models of Open Source and Free Software Development – Forking-Choosing an Open Source or Free Software License - Drafting Open Source Licenses.

**TEXT(S)**

1. Andrew M. St. Laurent, "Understanding Open Source and Free Software Licensing", O'Reilly Media, Inc, 2004, ISBN: 056005814.

## **REFERENCE MATERIALS**

1. PAUL KAVANAGH, “OPEN SOURCE SOFTWARE: IMPLEMENTATION AND MANAGEMENT” 1ST EDITION, DIGITAL PRESS 2004 , PAPERBACK ISBN: 9781555583200 EBOOK ISBN: 9780080492001.
2. M.N.RAO, “FUNDAMENTALS OF OPEN SOURCE SOFTWARE” 1ST EDITION, KINDLE EDITION, PHI LEARNING, 2014, ASIN: B00Y4PYZ94

## **21UCU704- INTRODUCTION TO CYBER SECURITY AND DIGITAL FORENSICS**

**CREDITS:4**

**CONTACT HRS/WEEK : 4**

### **SYLLABUS**

**Unit I:** Introduction to Cybercrime: Introduction – Cybercrime: Definition and origins of the word – Cybercrime and Information security – Who are cybercriminals? - Classification of Cybercrimes – Cybercrime: The Legal Perspectives.

**Unit II:** Cyber offenses: How criminal plan them: Introduction – How criminal plan the Attacks – Social Engineering – Cyberstalking – Cybercafe and Cybercrimes – Botnets: The fuel for Cybercrime – Attack vector. Cybercrime: Mobile and Wireless Devices:Security Challenges posed by Mobile Devices- Authentication Service Security – Attacks on Mobile/ Cellphones – Organizational Security Policies and measures in Mobile Computing Era.

**Unit III:** Tools and Methods used in Cybercrime: Proxy servers and Anonymizers – Phishing – Password Cracking – Keyloggers and Spywares –Virus and Worms –Trojan Horses and Backdoors – Steganography – DoS and DDoS attacks.

**Unit IV:** Digital Forensic: Introduction: What is Forensic Science? – What is Digital Forensic? – Uses of Digital Forensic – Locard’s Exchange Principle – Scientific Method – Role of the Forensic Examiner in the Judicial System. Labs and Tools: Forensic Laboratories – Policies and Procedures – Quality Assurance – Digital Forensic Tools.

**Unit V:** Collecting Evidence: Crime Scenes and collecting Evidence – Documenting the Scene – Chain of Custody – Cloning- Live Stream versus Dead System – Hashing – Final report. Mobile Device Forensics: Cellular Networks – Operating Systems – Cell phone evidence – Cell phone Forensic Tools.

### **TEXT(S)**

1. Sunit Belapure Nina Godbole, "Cyber Security" , 2011 edition, ISBN:978-81-265-2179-1, Wiley Publications(Unit I, II and III)
2. John sammons,"The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics", 1st Edition, Kindle Edition ,ISBN-13: 978-1597496612, ISBN-10: 1597496618 (Unit IVand V)

## **REFERENCE BOOKS**

1. Nihad Hassan,Rami Hijazi, “Digital Privacy and Security Using Windows: A Practical Guide”, ISBN 978-1-4842-2799-2, Apress publisher.
2. Nilakshi Jain- Dhananjay Kalbande, ”Digital Forensic : The fascinating world of Digital Evidences ” Wiley India Pvt Ltd 2017.

## **21UCS802 - PARALLEL AND DISTRIBUTED SIMULATION**

**CREDITS:4**

**MARKS: 40 +60**

### **SYLLABUS**

**Unit-I:** Background and Applications: Why Parallel/Distributed Simulation?- Analytic Simulations versus Virtual Environments-Historical Perspective-Applications-Hardware Platforms-State Changes and Time Flow Mechanisms.

**Unit-II:** Parallel And Distributed Discrete-Event Simulation: Conservative Synchronization Algorithms-Synchronization Problem-Deadlock Avoidance Using Null Messages-Deadlock Detection and Recover-Synchronous Execution-Conditional versus Unconditional Information-Dynamic Processes and Interconnections.

**Unit-III:** Time Warp: Preliminaries- Local Control Mechanism: Rolling Back State Variables- Unsending Messages- Zero Lookahead, Simultaneous Events, and Repeatability - Global Control Mechanism: Fossil Collection- Error Handling- Computing Global Virtual Time.

**Unit-IV:** Optimistic Synchronization Algorithms -Advanced Optimistic Techniques : Memory Utilization in Time Warp- Performance Hazards in Time Warp- Georgia Tech Time Warp (GTW)-Time Parallel Simulation.

**Unit-V:** Distributed Virtual Environments (DVEs)- DVEs: Introduction- Goals- Contrasting DVE and PDES Systems- Server versus Server less Architectures- Distributed Interactive Simulation- Dead Reckoning- High Level Architecture.

### **TEXT(S)**

1. “Parallel And Distributed Simulation Systems” by Richard M. Fujimoto, PhD,Georgia Institute of Technology. ISBN-13: 978-0471183839,ISBN-10: 0471183830

### **REFERENCE MATERIAL**

1. “Introduction to Parallel Algorithms” by Xavier And Iyengar, ISBN-13: 978- 471251828, ISBN-10: 0471251828

## **21UCS805 - USER INTERFACE AND USER EXPERIENCE DESIGN**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

#### **UNIT I: UNDERSTANDING GOAL-DIRECTED DESIGN**

Goal-Directed Design: Digital Products Need Better Design Methods - The Evolution of Design in Manufacturing - Planning and Designing Behavior - Recognizing User Goals - The Goal-Directed Design Process. Implementation Models and Mental Models: Implementation Models, User Mental Models- Represented Models- Most Software Conforms to Implementation Models - Mechanical-Age versus Information-Age Represented Models.

#### **UNIT II: DESIGNING BEHAVIOR AND FORM**

Synthesizing Good Design: Principles and Patterns: Interaction Design Principles - Design Values - Interaction Design Patterns. Platform and Posture: Posture - Designing Desktop Software - Designing for the Web - Other Platforms. Eliminating Excise: GUI Excise - Stopping the Proceedings - Common Excise Traps - Navigation Is Excise - Improving Navigation.

#### **UNIT III: DESIGNING GOOD BEHAVIOR AND VISUAL INTERFACE**

Designing Considerate Products - Designing Smart Products. Metaphors, Idioms, and Affordances: Interface Paradigms - Further Limitations of Metaphors - Building Idioms - Manual Affordances. Visual Interface Design: Art, Visual Interface Design, and Other Design Disciplines - The Building Blocks of Visual Interface Design - Principles of Visual Interface Design - Principles of Visual Information Design - Consistency and Standards.

#### **UNIT IV: DESIGNING INTERACTION AND WINDOWS BEHAVIORS**

Searching and Finding: Improving Data Retrieval – Storage and Retrieval Systems - Storage and Natural Language Output: An Ideal Interface for Attribute-Based Retrieval. Window Behaviors: PARC and the Alto - PARC's Principles - Microsoft and Tiled Windows - Full-Screen Applications - Multipaned Applications - Designing with Windows - Window States - MDI versus SDI.

#### **UNIT V: CONTROLS, MENUS, TOOLBARS, DIALOGS**

Controls: Avoiding Control-Laden Dialog Boxes - Imperative Controls - Selection Controls - Entry Controls - Display Controls. Menus: Menus Today: The Pedagogic Vector - Optional

Menus - Menu Idioms. Toolbars: Visible, Immediate Commands - Toolbars and Toolbar Controls - Appropriate Uses for Dialog Boxes - Four Different Purposes for Dialogs - Managing Content in Dialog Boxes - Errors, Alerts, and Confirmation Dialogs.

#### **TEXTS**

1. Alan Cooper, Robert Reimann , David Cronin, "About Face 3: The Essentials of Interaction Design, John Wiley & Sons (15 May 2007), ISBN-13: 978-0470084113

#### **REFERENCE(s):**

1. IDEO, "The Field Guide to Human-Centered Design", IDEO.ORG (2015), ISBN-13: 978-0991406319
2. Jesse James Garrett , "The Elements of User Experience: User-Centered Design for the Web and Beyond - Voices That Matter", New Riders; 2 edition (16 December 2010), ISBN-13: 978-0321683687

## 21UCU808 - MANAGING CLOUD SERVICES

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

**Unit I:** Cloud Computing Fundamentals : Motivation for Cloud Computing-Defining Cloud Computing-Principles of Cloud computing-Cloud Ecosystem-Requirements for Cloud Services-Cloud Application-Benefits and Drawbacks- Cloud Computing Architecture and Management: Cloud Architecture- Network Connectivity in Cloud Computing- Applications on the Cloud-Managing the Cloud- Migrating Application to Cloud. Cloud Deployment Models: Private Cloud - Public Cloud- Community Cloud- Hybrid Cloud.

**Unit II:** Cloud Service Models: Introduction- Infrastructure as a Service- Platform as a Service- Software as a Service- Technological Drivers for Cloud Computing: SOA and Cloud-Virtualization- Memory and Storage Technologies- Networking Technologies- Software Process Models for Cloud.

**Unit III:** Programming Models - Operating System- Application Environment – Virtualization- Programming Models for Cloud Computing- Software Development in Cloud: Introduction - Different Perspectives on SaaS Development- New Challenges- Cloud-Aware Software Development Using PaaS Technology.

**Unit IV:** Networking for Cloud Computing: Overview of Data Center Environment- Networking Issues in Data Centers- Transport Layer Issues in DCNs- TCP Enhancements for DCNs- Cloud Service Providers: EMC-Google-Amazon Web Services – Microsoft – IBM –SAP Labs-Salesforce – Rackspace-VMware-Manjrasoft. Open Source Support for Cloud: Open Source Tools for IaaS- Open Source Tools for PaaS- Open Source Tools for SaaS- Open Source Tools for Research - Distributed Computing Tools.

**Unit V:** Security in Cloud Computing: Introduction- Security Aspects- Platform-Related Security- Audit and Compliance- Advanced Concepts in Cloud Computing: Inter cloud - Cloud Management- Mobile Cloud- Media Cloud - Interoperability and Standards - Cloud Governance - Computational Intelligence in Cloud - Green Cloud - Cloud Analytics.



**TEXT(S)**

1. K.Chanrasekaran, “ Essentials of Cloud Computing”, A Chapman & Hall Book, CRC Press, ISBN-13:978-1-4822-0544-2, 2015.

**REFERENCE MATERIALS**

1. T. Velte, A. Velte, R. Elsenpeter, “Cloud Computing, A Practical Approach”, McGraw- Hill, 2009. Cloud Security Alliance, “Providing greater clarity in Security as a Service”, 2013.
2. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, “Mastering cloud computing”, Morgan Kaufman, 2013.
3. Dr. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More”, Jones and Bartlett learning, First edition, 2013.
4. ArshdeepBahga, Vijay Madisetti, “Cloud Computing: A Hands-On Approach”, Create Space Independent Publishing Platform, 1st edition, 2013.
5. GautamShroff, “Enterprise Cloud Computing Technology Architecture Applications”, Cambridge University Press; 1st Edition, 2010.

## 21UCU811- WEB HOSTING

**CREDITS:4**

**MARKS: 40 + 60**

### SYLLABUS

#### **Unit I: WordPress**

The cost of owning your own site: The website domain – Website hosting – Registrars & Web hosts. Installing WordPress: Installing the SSL certificate – Installing WordPress. WordPress web pages.

#### **Unit II: WordPress settings**

General settings - Writing –Reading - Discussion – media – Permalinks – Privacy. User Profile: Gravatars. Tools: Appearance menu – Plugins.

#### **Unit III: Web databases**

Databases for Non-Programmers –Database design – using MySQL – Alternative database packages – The SQL language – Databases for websites – Typical database setup – Database tools: Using phpMyAdmin – Indexing, Backing up and maintenance issues – Connecting databases with PHP.

#### **Unit IV: Web 2.0 features**

What is Web 2.0?- AJAX – RSS- Social networking- Integration with web services – Amazon web services (AWS) – eBay – Google.

#### **Unit V: Setting up with Open Source:**

What do you need? –Choosing a Web host – Installing the site – Examples –Static site – Adding a Bulletin Board – Basic Content Management system.

#### **TEXT(S)**

1. Dr. Andy William, “WordPress for Beginners 2020: A Visual Step-by-Step Guide to Mastering WordPress (Webmaster Series Book 2)”, updated 18<sup>th</sup> December 2019 [Unit I & II]
2. Guy W. Lecky-Thompson, “Just Enough Web Programming with XHTML, PHP, and MySQL”, ISBN-13: 978-1598634815, ISBN-10: 159863481X [Unit III, IV & V]

#### **REFERENCE BOOKS**

1. Lisa Sabin-Wilson, “WordPress All-in-One For Dummies (For Dummies (Computer/Tech)) 4th Edition”, ISBN-13: 978-1119553151, ISBN-10: 1119553156 [Unit I & II]

2. Peter Pollock, “Web Hosting For Dummies 1st Edition”, ISBN-13: 978-1118540572,  
ISBN-10: 1118540573 [Unit III, IV & V]

**21UCU555, COMPUTING LABORATORY 5 – .NET PROGRAMMING**

**CREDITS:2**

**MARKS: 40 + 60**

**SYLLABUS**

**COMPUTING LABORATORY - 5 :: .Net PROGRAMMING**

**VB. NET PROGRAMMING**

1. Generate a program to create a Calculator using arithmetic operators.
2. Create a program for font application using validation controls.
3. Create a program for displaying supplier information using control structures.
4. Create a program for displaying the employee pay details using grid view.
5. Create a program for creating notepad application implementing menus.
6. Create a program for hospital management to generate crystal reports.

**ASP. NET PROGRAMMING**

1. Create a web application to find the number of days between given date using calendar control.
2. Create an ASP.NET program to change the font applications of the text
3. Create an ASP.NET program to display the properties of ASP.Net object.
4. Create a database program for login form to check whether given username and password are valid or not.
5. Create an ASP.NET program for Advertisement using AD Rotator.
6. Create an ASP.NET program to split the web site using Frameset.

**REFERENCE URL:**

<http://vlabs.iitkgp.ac.in/vlt/project.html>

**Tools Required:**

**TEXTbook(S)**

- 1.ASP.NET Web Deployment using Visual Studio ,Tom Dykstra, Microsoft,2013

**21UCU556, COMPUTING LABORATORY 6 – MOBILE APPLICATION  
DEVELOPMENT**

**CREDITS:2**

**MARKS: 40 + 60**

**SYLLABUS**

1. Sending E-mail and SMS using mobApp
  2. Create a Web-View
  3. To turn on/off Mobile Data
  4. To create timer clock
  5. To Convert Text Message to Audio
  6. To display pop-up notifications
  7. Creating Login Page
  8. Creating Splash Screen
  9. Developing User Interface Design
  10. Developing stand alone debugging
- .....

**REFERENCE URL:**

<http://vlabs.iitkgp.ac.in/vlt/project.html>

**Tools Required:**

**TEXTBOOK(S)**

1. Native Mobile Development, A Cross-Reference for ios And Android Native Programming, [Shaun Lewis](#), [Mike Dunn](#), Amazon, 2019

# SEMESTER-VI

## 21UCS503 - INFORMATION AND CODING THEORY

CREDITS:4

MARKS: 40 +60

### SYLLABUS

#### Unit I

Introduction-Communication Systems-Information Theory - Entropy- Channel Capacity – Binary Symmetric Channel – AWGN Channel -A Simple Channel Code- Fundamentals of Block Codes - Code Parameters – Maximum Likelihood Decoding – Binary Symmetric Channel – Error Detection and Correction - Linear Block Codes- Generator Matrix – Parity Check Matrix – Syndrome and Cosets – Dual Code – Linear Block Codes - Cyclic Codes – Generator Polynomial – Parity Check Polynomial – Linear Feedback Shift Registers – BCH Codes – Reed Solomon Codes.

#### Unit II

Encoding of Convolution Codes – Generator Matrix in the Time Domain – State Diagram – Code Termination – Puncturing – Generator Matrix in the D-Domain – Encoder Properties – Minimum Distance Coding - Trellis Diagram – Viterbi Algorithm – Free Distance – Active Distance – Weight Enumerators – Path Enumerators – Pairwise Error Probability – Viterbi bond.

#### Unit III

Soft Input Decoding – Euclidean Metric – Support of Punched Codes – Implementation Issues – Soft output Decoding – Derivation of APP Decoding – APP Decoding in the Log Domain – Coding of Speech Data – Hybrid ARQ – EGPRS Modulation and Coding – Retransmission Mechanism – Link Adaption – Incremental Redundancy.

#### Unit IV

Turbo Codes – LDPC Codes – Sparse Graphs – Decoding for the Binary Erasure Channel – Log Likelihood Algebra – Belief Propagation – Product Codes – Parallel Concatenation – The UMTS Turbo Code – Serial Concatenation – Partial Concatenation – Turbo Decoding – EXIT Charts – Weight Distribution – Woven Convolutional Codes – Encoding Schemes – Distance Properties of Woven Codes – Woven Turbo Codes – Interleaver Design.

#### Unit V

Space Time Codes – Digital Modulation Schemes – Diversity – Spatial Channels – Models – Channel Estimation – Performance Measures – Channel Capacity – Outage Probability – Ergodic Error Probability – Orthogonal Space Time Block Codes – Alamouti's Scheme – Simulation Results – Spatial Multiplexing – Iterative APP Preprocessing and Per-Layer Decoding – Linear

Multilayer Detection – BLAST Detection – QL Decomposition – Performance of Multilayer Detection Schemes – Linear Dispersion Codes.

**TEXT(S)**

1.AndreNeubauer, Jurgen Freuden Berger, Volker Kuhn ” Coding Theory Algorithms, Architectures and Applications “ Wiley India Pvt Ltd, ISBN: 978-0-470-02861-2, 2007.

**REFERENCE MATERIALS**

1. Ranjan Bose, “ Information Theory , Coding and Cryptography “ , Second Edition , Tata McGraw-Hill, ISBN:978-0-07-0669017, 2008.

2.StefanM.Moser , Po-Ning Chen , “ Coding and Information Theory “ , Cambridge University Press, ISBN:978-1-107-01583-8,2012.

3.RaymondW.Yeung “ Information Theory and Network Coding “, Springer, ISBN:978-0-387-79233-0.



## 21UCS506 - APPLICATIONS OF AI IN INDUSTRIES

**CREDITS:4**

**MARKS: 40 +60**

### SYLLABUS

**Unit-I:** Introduction -The Development and Application of AI technology-Why do we need Industrial AI: New Perspectives I n Industrial system for AI-The Basic method of Solving Problems with AI-What kind of AI Technology is most suitable for Industry-When Machine Intelligence meets Industry- Difference between Industrial AI-Challenges of AI in Industry

**Unit-II:** Definition and Meaning of Industrial AI-The Beginnings of Industrial AI-The Purpose And Value of Industrial AI-Technical elements of Industrial AI-CPS: An architecture for Integrating the Technological elements of Industrial Intelligence- Industrial AI: Categories of Algorithms- Industrial AI Algorithms.

**Unit-III:** Killer Applications of Industrial AI-Application Scenario types of Industrial AI-What will become the Killer Applications of Industrial AI-Predictive Maintenance of Equipment-Virtual Metrology and Process Quality Control-Energy Management and Energy Efficiency Optimization-Defect Deduction and Material sorting based on Machine Vision-Scheduling Optimization for Production and Maintenance Plan.

**Unit-IV:** Enabling Industrial AI Systems-Intelligent Monitoring and Maintenance platform for CNC machines-Intelligent Operations and Maintenance system for Offshore Wind Forms-Intelligent Rail Transit predictive Maintenance System.

**Unit –V:** How to Establish Industrial AI Technology and Capability-Assessment of Basic Capability Maturity during Industrial Intelligence Transformation-Assessment tools for Global Industrial AI Enterprise-Foxconn Lighthouse Factory-How to Construct the Organizational Intelligent Transformation Ability in Industrial Enterprise-Open source Industrial Big data Competitions.

### TEXT(S)

1. Industrial AI: Applications with Sustainable Performance” by Jay Lee, ISBN : 978-981-15-2144-7

### REFERENCE MATERIALS

1. Artificial Intelligence: A Modern Approach (3rd Edition) by Stuart Russell, Peter Norvig

**21UCS803 - HIGH PERFORMANCE PARALLEL COMPUTING :TOOLS AND  
APPLICATIONS**

**CREDITS:4**

**MARKS: 40 +60**

**SYLLABUS**

**Unit – I:** Introduction to Quantitative Design and Analysis- Defining Computer Architecture- Memory Technology and Optimizations

Practical:

1. Write a program for Matrix Multiplication using Cannon's Algorithm for Large Matrices?

**Unit-II**

Graphics Processing Units- Introduction to GPU- Detecting and Enhancing Loop-Level Parallelism.

Practical:

1. Write a program for Picture Scaling using GPU programming?
2. Write a program for 1D, 2D, and 3D Stencil Operations using GPU programming?

**Unit-III**

Multi-core Processors and Their Performance- Programming Models and Workloads for Warehouse-Scale Computers.

Practical:

1. Write a program for Vector Addition using Xeon Phi Programming?

**Unit-IV**

Background and Applications: Why Parallel/Distributed Simulation?- Analytic Simulations versus Virtual Environments.

Practical:

- 1.Solve a stationary heat conduction problem on a shared memory computer using OpenMP?

**Unit-V**

Parallel And Distributed Discrete-Event Simulation: Conservative Synchronization Algorithms-Synchronization Problem-Deadlock Avoidance Using Null Messages-Deadlock Detection and Recovery

Practical:

1. Mini Project

- a. Develop a Molecular dynamics simulation problem using OpenMP programming?
- b. 3D Black Scholes
- c. poissinv

**TEXT(S)**

1. THOMAS STERLING MACIEJ BRODOWICZ MATTHEW ANDERSON. PAPERBACK ISBN: 9780124201583. EBOOK ISBN: 9780124202153
2. “Parallel And Distributed Simulation Systems” by Richard M. Fujimoto, PhD, Georgia Institute of Technology. ISBN-13: 978-0471183839, ISBN-10: 0471183830

**REFERENCE MATERIALS**

1. High Performance Computing: Modern Systems and Practices, by Maciej Brodowicz, Thomas Sterling, Matthew Anderson, Publisher: Morgan Kaufmann; 1 edition (December 19, 2017). ISBN-10: 012420158X, ISBN-13: 978-0124201583
2. “Introduction to Parallel Algorithms” by Xavier And Iyengar ISBN-13: 978-0471251828, ISBN-10: 0471251828

## **21UCS806-SOFTWARE TESTING**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

#### **Unit I: SOFTWARE DEVELOPMENT LIFE CYCLE MODELS**

Phases of Software Project – Quality, Quality Assurance, and Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing –Challenges in White-Box Testing.

#### **UNIT II: BLACK-BOX TESTING**

What is Black-Box Testing? - Why Black-Box Testing? – When to do Black-Box Testing? – How to do Black-Box Testing? – Challenges in Black Box Testing - Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase of Testing – Scenario Testing – Defect Bash.

#### **UNIT III: SYSTEM AND ACCEPTANCE TESTING**

System Testing Overview – Why System testing is done? – Functional versus Non-functional Testing - Functional testing - Non-functional Testing – Acceptance Testing – Summary of Testing Phases.

#### **UNIT IV: PERFORMANCE TESTING**

Factors governing Performance Testing – Methodology of Performance Testing – tools for Performance Testing – Process for Performance Testing – Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.

#### **UNIT V: TEST PLANNING, MANAGEMENT, EXECUTION AND REPORTING**

Test Planning – Test Management – Test Process – Test Reporting –Best Practices. Test Metrics and Measurements: Project Metrics – Progress Metrics – Productivity Metrics – Release Metrics.

#### **TEXTS**

1. Srinivasan Desikan & Gopalswamy Ramesh, “ SOFTWARE TESTING Principles and Practices”, Pearson Education. , 2006

## **REFERENCES**

1. Gopaldaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013, ISBN: 978-0070598973.
2. Paul Ammann and Jeff Offutt, "Introduction to Software Testing", Cambridge University Press; 2 edition (December 13, 2016), ISBN-10: 9781107172012,ISBN-13: 978-1107172012
3. A Kelkar, "Software Project Management A Concise Study", Third Edition, 2012, PHI Learning, ISBN-10: 8120347021, ISBN-13: 978-8120347021.

## 21UCU809 - CYBER SECURITY

**CREDITS:4**

**MARKS: 40 + 60**

### SYLLABUS

**Unit I:** Introduction to Cybercrime – Definition – Cybercrime and Information Security – Cyber Criminals - Classification of Cybercrimes – Cybercrime The Legal Perspective - Cybercrime An Indian Perspective – Hacking and the Indian Law – A Global Perspective on Cybercrimes and the extended Enterprise.

**Unit II:** Categories of Cybercrimes – Passive Attacks – Active Attacks – Scanning and Scrutinizing Gathered Information – Classification of Social Engineering – Cyberstalking – Cybercafe and Cybercrimes – Botnet – Attack Vector – Cybercrime and Cloud Computing – Proliferation of Mobile and Wireless Devices – Types and Techniques of Credit Card Frauds – Authentication Service Security – Attacks on Mobile Phones – Security Implication for organization.

**Unit III:** Tools and Methods used in Cybercrime – Proxy Servers and Anonymizers – Phishing – Password Cracking – key loggers and Spywares - Virus and Worms – Trojan Horses and Backdoors – Steganography – DoS and DDoS Attacks – Attacks on Wireless Networks.

**Unit IV: Cybercrimes and Cyber Security** – Cybercrimes and Legal Landscape around the World – Cyber laws – The Indian IT Act – Challenges to Indian Law – Cybercrime Scenario in India – Digital Signatures – Cybercrime and Punishment - Cyber law and Technology.

**Unit V:** Cyber Security: Organizational Implications – Insider Attack – IPR Issues – Organizational Implication of Software Piracy – Web Threats for Organization – Security and Privacy Implications from Cloud Computing – Security Risks and Perils for Organizations – Social Computing and Associated Challenges for Organization – Developing an Organization Policy for Computer usage – An essential component of Cyber Security.

### TEXT(S)

1. Nina Godbole , Sunit Belapure , “ Cyber Security – Understanding Cyber Crimes , Computer Forensics, Legal Perspective “ , John Wiley & Sons , ISBN:978-81-265-2179-1,2011.

### REFERENCE MATERIALS

1. William Stallings, Cryptography and Network Security: Principles and Practices, Seventh Edition, Pearson Education Asia,2016.

2. Joseph Steinberg “ Cyber Security for Dummies “, Wiley Publications , 2019.

3. Phillip Ferraro , “ Cyber Security Everything an Executive Need to Know “ , Hasmark Publication , ISBN:978-1-988071-20-6, 2016.

## 21UCU812 - SOFTWARE STARTUP

CREDITS:4

MARKS: 40 + 60

### SYLLABUS

**Unit I: What is a startup:** Definition, characteristics and their types –How to create a startup – How to start a Business: Step by step plan -How To Start A Software Development Business: Steps to start a software development business.

**Unit II: Software Tools for startup:** Ideation Tools – MVP Tools – Launch Tools – Marketing Tools – Finance and Fundraising tools – CRM tools- Design & Development tools.

**Unit III: Startup Marketing:** The Foundations of Startup Marketing - Paid Media Marketing for Startups - Earned Media Marketing for Startups - Owned Media Marketing for Startups.

**Unit IV: Content Marketing:** Why is a content marketing strategy important? - How does SEO fit in? - Benefits- B2C vs B2B content marketing - Brief history- How content marketing relates to traditional marketing - Types of content- Distribution channels for content - Understanding your target audience - Quantity v quality - User experience and customer service - Converting with CTAs .

**Unit V: Digital Marketing:** Why is Digital marketing is important for startups? .Decision making at startup: Decision Making Model: Strategic- Tactical –Operational – Application of Decision Making Model.

### E-RESOURCES

#### Unit I

- <https://www.the-itfactory.com/startup-knowledgebase/en/article/what-is-a-startup/>
- <https://www.inacademy.eu/blog/how-to-create-a-startup/>
- <https://www.businessnewsdaily.com/4686-how-to-start-a-business.html>
- <https://howtostartanllc.com/business-ideas/software-development>

#### Unit II

- <https://www.cloudways.com/blog/best-startup-tools/>

#### Unit III

- <https://www.ventureharbour.com/ultimate-startup-marketing-strategy/>

#### Unit IV

- <https://www.brafton.com/content-marketing/>

#### Unit V

- <https://hafizmuhammadali.com/blog/digital-marketing-for-startups/>
- <https://www.lathamdrive.com/resources/insights/decision-making-at-a-startup-strategic-tactical-and-operational>



## INTERDISCIPLINARY ELECTIVE COURSES TO OTHER DISCIPLINES

### 21UCS601, OVERVIEW OF PROGRAMMING LOGIC

CREDITS:4

MARKS: 40 +60

#### SYLLABUS

##### Unit I:

**General Problem Solving Concepts:** Problem Solving in Everyday Life – Types of Problems – Problem Solving with Computers – Difficulties with Problem Solving – **Beginning Problem Solving Concepts for Computer:** Constants and Variables – Data Types – How the Computers Stores Data – Functions – Operators – Expression and Equation. **Planning Solution:** Communicating with the Computer – Organizing the Solution – Unified Modeling Language - Coding and Testing the Solution – Software Development Life Cycle.

##### Unit II

**An Introduction to Programming Structure:** Pointers for Structuring Solution – The Modules and their Functions – Cohesion and Coupling – Local and Global Variables – Parameters – Return Values – Variable Names and the Data Dictionary – The Three Logic Structures. **Problem Solving with Sequential Logic Structure:** Algorithm Instructions – Flowchart Symbols – Pseudocode – The Sequential Logic Structure – Solution Development.

##### Unit III

**Problem Solving with Decisions:** The Decision Logic Structure – Multiple Decision Instructions – Using Straight Through logic – Using Positive Logic – Using Negative Logic – Logic Conversion – Decision Tables – Case Logic Structure. **Problem Solving with Loops:** The logic Loop Structure- Incrementing – Accumulating – While/WhileEnd – Repeat / Until – Automatic Counter Loop – Nested Loops – Indicators – Algorithm Instructions and Flowchart Symbols- Recursion.

##### Unit IV

Tables - Records - Fields – Graphical User Interface – Event Driven Programming - Game Development – Planning the Game – Steps to Develop a Simple Game – Assembly Languages – High Level Languages – Assembly Language Instructions – Assembly Language Equivalent – Four Logic Structures.

##### Unit V

File Concepts – Processing Sequential Access Files – The Primer Read – Designing output Records – Heading and Line Counters – Control Breaks – Multiple Control Breaks – Using

Indicators for Programming Control – Error Handling – Null Files – Creating Files – The Master File – Transaction Files – Activity Files – Backup Files – Updating the Master File using Transaction File – Putting it All Together – A useful Alternative method.

**TEXT(S)**

1. Maureen Sprankle and Jim Hubbard, “ Problem Solving and Programming Concepts” , Pearson Publications, ISBN-13:973-0-13-249264-5 .

**REFERENCE MATERIALS**

1. Joyce Farrell , “ Programming Logic and Design “ Seventh Edition, Course Technology, ISBN-13: 978-1-111-96975-2 , 2013.
2. Zohar Manna and Richard Waldinger“ The Logic of Computer Programming”, SRI International, 2013.
3. Ulf Nilsson and Jan MaluszynskiLogic “ Logic,Programming and Prolog”, John Wiley & Sons , 2000.

## **21UCS602 - APPLIED ARTIFICIAL INTELLIGENCE**

**CREDITS:4**

**MARKS: 40 +60**

### **SYLLABUS**

#### **UNIT – I**

Basic Terminology in Artificial Intelligence: AI vs. AGI - Modern AI Techniques . The Machine Intelligence Continuum: Systems That Act - Systems That Predict - Systems That Learn - Systems That Create - Systems That Relate - Systems That Master – Systems that Evolve. The Promises of Artificial Intelligence – The Challenges of Artificial Intelligence – Designing Safe and Ethical AI.

#### **UNIT – II**

Build an AI-Ready Culture : Be Honest About Your Readiness - Choose the Right Champions - Build An Enterprise-Wide Case For AI - Why You Need a Multi-Disciplinary “AI SWAT Team” - Get Organizational Buy-In - Educate Your Stakeholders

Plan Your Implementation : Rank Business Goals - Perform Opportunity Analysis - AI Strategy Framework - Know Your Data and Analytics - Technical Prerequisites - Build vs. Buy - Calculate ROI and Allocate Budget - Pick the Right “True North” Metric

#### **UNIT – III**

Build Machine Learning Models : AI Is Not a Silver Bullet - Assessing the Performance of Your Models - Common Mistakes With Machine Learning Models - Machine Learning Workflow - Maintain an Experimental Mindset.

Experiment And Iterate : Agile Development - Technical Debt - Deployment and Scaling - Iteration and Improvement.

#### **UNIT - IV**

Obstacles And Opportunities : Current Obstacles - What AI Can Do for Enterprise Functions . General And Administrative : Finance and Accounting - Legal and Compliance - Records Maintenance - General Operations.

Business Intelligence And Analytics : Data Wrangling - Data Architecture - Analytics . Software Development.

#### **UNIT – V**

Marketing : Digital Ad Optimization - Recommendations and Personalization. Sales : Customer Segmentation - Lead Qualification and Scoring - Sales Development - Sales Analytics. Customer Support : Conversational Agents - Social Listening - Customer Churn - Lifetime Value . The Ethics of Enterprise AI.

#### **TEXT BOOK**

- Mariya Yao, Marlene Jia, Adelyn Zhou, “Applied Artificial Intelligence”, TOPBOTS Inc., 2017. ISBN : 978-0-9982890-2-1

## **REFERENCE BOOKS**

1. “Innovation, Opportunities and Challenges in Applied Artificial Intelligence, Data Science and Machine Learning”, Prof. Pramod Singh Rathore , Prof. Jyotir Moy Chatterjee, 2019.ISBN : 978-8194050209.
2. “Artificial Intelligence for dummies”, John Paul Mueller, Luca Massaron, Wiley Publications, 2018. ISBN : 978-8126576104.

## **21UCS603 - WEB DESIGN**

**CREDITS:4**

**MARKS: 40 + 60**

### **SYLLABUS**

#### **UNIT I: WORDPRESS AND JOOMLA**

WordPress – Installation - Dashboard - Settings- Categories - Posts-Media – Pages –Tags – Links – Comments – Plugins – Users - Appearance. Joomla: Installation-Control Panel-Menus-Modules-Templates Manager.

#### **UNIT II: BOOTSTRAP**

Introduction, Bootstrap Environment Setup- Download Bootstrap, File structure, HTML Template. Bootstrap Grid System: Working of Bootstrap Grid System - Grid options -Basic Grid Structure - Bootstrap Grid System Example: Mobile, Tablet, Desktops.

#### **Unit III: WEB HOSTING**

What is web hosting?-What else you need to know-Think of your website as a real business-Avoid beginner’s misconceptions. Evaluating Available Technologies: Domain name - what is a domain name? - Different types of domains - what is the best domain for my website?

#### **Unit IV: WEB HOSTING OS AND BUILDING WEBSITE OR A BLOG**

The computer OS you’re using is unrelated - The real criteria for choosing the right OS - What else do you need to know about the hosting company?- How to choose the best web hosting company for your needs - Web hosting server types - Evaluate the web hosting company and its services. What type of a website are you planning to build? - Creating a standard website or a blog -Creating an ecommerce website - Building a website or blog - Hosted website solutions.

#### **UNIT V: MANAGING FILES, EMAIL AND SECURITY**

Essential services and how to use them: Creating email address- Reading and writing with email clients - Email tips and tricks. Managing website files: Installing and using FTP client - Backing up your website - cPanel - Installing web tools / platforms - Website security - Transferring domains - Speeding up your site - SSL certificates.

## TEXT(S)

Thomas Powell, “Web Design: The Complete Reference”, McGraw-Hill Education, First Edition”, ISBN-13: 978-0072122978.

## WEB REFERENCES:

- <https://www.tutorialspoint.com/wordpress>
- <https://www.javatpoint.com/joomla>
- <https://www.tutorialspoint.com/bootstrap> (*BOOTSRAP TUTORIAL- Simply Easy Learning by tutorialspoint.com*)
- Web Hosting Explained The Beginner’s Guide to Small Business Website Hosting  
[https://firstsiteguide.com/fsg\\_web\\_hosting.pdf](https://firstsiteguide.com/fsg_web_hosting.pdf)

## **21UCS557: COMPUTING LABORATORY 7 – WEB DESIGN**

**CREDITS:2**

**MARKS: 40 + 60**

### **SYLLABUS**

1. Create a webpage using basic HTML tags and hyperlinks
2. Create a webpage using TABLE tag to display class timetable.
3. Create a static web page which defines all text formatting tags of HTML in tabular format
4. Create webpage using list tags of HTML
5. Working with Frame and Form tags
6. Image tags & embedding a multimedia on to a web page
7. Create a webpage using FORM tag to enter student bio-data.
8. Create employee registration webpage using HTML form objects
9. Create a login page in HTML
10. Design a web page using CSS

#### **Tools Required:**

1. Dreamweaver
2. Bootstrap
3. Firefox developer
4. Text editor

#### **TEXTS**

1. Jennifer Niederst Robbins, “A Beginner’s Guide to HTML,CSS and JavaScript”, Fourth Edition”, ISBN-13: 978-9350238912.
2. Jon Duckett, “HTML and CSS:Design and Build Websites”, John Wiley & Sons ,First Edition,ISBN-13: 978-1118008188.
3. Jennifer Niederst Robbins, “Learning Web Design”, O'Reilly Media ,Fourth Edition, ISBN-13: 978-1449319274.

#### **REFERENCE BOOKS**

1. Jon Duckett, “HTML and CSS”, Wiley, First Edition”, ISBN-13: 978-1118008188.
2. Thomas Powell, “Web Design: The Complete Reference”, McGraw-Hill Education, First Edition”, ISBN-13: 978-0072122978.

## **21UCS558 - COMPUTING LABORATORY 8-ARTIFICIAL INTELLIGENCE**

**CREDITS:4**

**MARKS: 40 +60**

### **SYLLABUS**

#### **Computing Laboratory- Artificial Intelligence**

1. Write a simple prolog program to study fact, verification, domain, predicate and clauses section Prolog: A Systematic Study?
2. Write a python program to remove stop words for a given passage from a text file?
3. Write a Program to create a Chatbot?
4. Algorithms to Implement Searching technique?
5. Solve Robot (traversal) problem using means End Analysis?
6. Write a Program to implement the Concept of Intelligent Systems?

#### **Mini-Project**

1. Develop a Mini-project using Artificial intelligence Concepts on Student Information Chatbot
2. Develop a Project for Android Attendance System using AI Concepts
3. Develop a Classification of objects in images based on various object representations
4. Develop a Data mining algorithm to analyze medical data
5. Develop a Voice Controlled Material handling Robot

#### **TEXT(S)**

1. "Artificial Intelligence-A Modern Approach",Third Edition by Stuart J. Russell and Peter Norvig. Published by Pearson Education, Inc.,Upper Saddle River, New Jersey 07458. ISBN-13: 978-0-13-604259-4

#### **REFERENCE MATERIALS**

1. Artificial Intelligence for Robotics" by Francis X. Govers Published by Packt Publishing Ltd., ISBN 978-1-78883-544-2
2. Industrial AI: Applications with Sustainable Performance" by Jay Lee, ISBN : 978-981-15-2144-7