# Detailed Scheme

## ACADEMIC YEAR 2022-2023

## Dr. Ambedkar Institute of Technology
## Bangalore

## III-IV (2021-2025 BATCH) (160Credits)

## B.E

## Department Of Information Science and Engineering

**Vision**

- To create **D**ynamic, **R**esourceful, **A**dept and **I**nnovative **T**echnical professionals to meet global challenges.

**Mission**

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

**DEPARTMENT VISION AND MISSION**

**Vision:**

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

**Mission:**

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

**PEO1:** Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

**PEO2:** Graduates will be equipped to enhance their knowledge through core engineering and latest technological skills to promote lifelong learning.

**PEO3:** Graduates will be able to take up social, technical and entrepreneurial challenges in inter disciplinary and multi disciplinary fields.

## PROGRAM SPECIFIC OUTCOMES( PSOS)

**PSO1:**Students should be able to develop and optimize solutions for information systems employing fundamentals of mathematics, Hardware, software, data storage, security and communication networks.

**PSO2**:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

**PSO3:**Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

## PROGRAMME OUTCOMES (POs)

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
**2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
**3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
**4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
**5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
**9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

**Dr.AmbedkarInstituteofTechnology,Bengaluru-560056**
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)(As per NEP 2020)**
**B.E. INFORMATION SCIENCE AND ENGINEERING**
**Tentative Scheme of Teaching and Examination effective from the Academic Year 2022-23**

**III Semester**

| Sl. No. | Course Category | Course Code | CourseTitle | Teaching Department (TD)/ Paper setting Board(PSB) | Teaching Hrs/ Week | | | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | S | Total | Duration (Hrs) | CIE Marks | SEE Marks | Total Marks | |
| **1** | BSC | 21MAT301IS | Mathematics Course (Discrete Mathematical Structures) | Mathematics | 3 | 1 | 0 | 0 | 04 | 03 | 50 | 50 | 100 | 3 |
| **2** | IPCC | 21IST302 | Digital Electronics and Computer Organization | ISE | 3 | 0 | 2 | 0 | 05 | 03 | 50 | 50 | 100 | 4 |
| **3** | IPCC | 21IST303 | Unix and Shell Programming | ISE | 3 | 0 | 2 | 0 | 05 | 03 | 50 | 50 | 100 | 4 |
| **4** | PCC | 21IST304 | Data Structure with C | ISE | 3 | 1 | 0 | 0 | 04 | 03 | 50 | 50 | 100 | 3 |
| **5** | PCC | 21ISL305 | Data Structure with C Lab | ISE | 0 | 0 | 2 | 0 | 02 | 03 | 50 | 50 | 100 | 1 |
| **6** | UHV | 21HST306 | Social Connect and Responsibility | Any Department | 0 | 0 | 1 | 0 | 01 | 01 | 50 | 50 | 100 | 1 |
| **7** | HSSC | 21HST3S07 / 21HST3B07 | Samskrutika Kannada / Balake Kannada | HSS | 1 | 0 | 0 | 1 | 02 | 01 | 50 | 50 | 100 | 1 |
| | | OR | | | | | | | | | | | | |
| | | 21HST307 | Constitution of India & Professional Ethics(CIP) | | | | | | | | | | | |
| **8** | AEC | 21IST308X | Ability Enhancement Course – III | TD: Concerned department PSB: Concerned Board | If offered as Theory Course | | | | 01 | 01 | 50 | 50 | 100 | 1 |
| | | | | | 2 | 0 | 0 | 0 | | | | | | |
| | | | | | If offered as Lab. Course | | | | 02 | 02 | | | | |
| | | | | | 0 | 0 | 2 | 0 | | | | | | |
| **9** | HSSC | 21HSN309 | Professional skills | HSS | 1 | 0 | 1 | 0 | | 02 | 50 | --- | PP/NP | 0 |
| | | | | | | | | | | **Total** | **450** | **400** | **800** | **18** |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **10** | Scheduled activities for III to VIII semesters | 21HSNS803 | National Service Scheme(NSS) | NSS | All students have to register for any one of the courses namely National Service Scheme, Physical Education (PE)(Sports and Athletics), and Yoga with the concerned coordinator of the course during the first week of III semester. The activities shall be carried out between III semesters to VIII semester (for 5 semesters). SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIE marks shall be added to the SEE marks. Successful completion of the registered course is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS,PE, and Yoga activities. | | | | | | | | | | |
| | | 21HSN803 | Physical Education(PE) (Sports and Athletics) | PE | | | | | | | | | | | |
| | | 21HSN803 | Yoga | Yoga | | | | | | | | | | | |

**Course prescribed to lateral entry Diploma holders admitted to III semester B.E. programs**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **11** | 21MAD310 | Additional Mathematics–I | Maths | 02 | 02 | -- | -- | -- | 50 | --- | 50 | PP/NP |

**Note: BSC:** Basic Science Course, **IPCC :** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT**–Internship, **HSSC:** Humanity and Social Science Courses ,
**AEC**–Ability Enhancement Courses. **UHV:** Universal Human Value Course.
**L–**Lecture, **T–**Tutorial, P-Practical/ Drawing ,**S–**Self Study Component ,**CIE:** Continuous Internal Evaluation, **SEE:** Semester End Examination.
**TD-**Teaching Department, **PSB**: Paper Setting department.

21HST307/407 Samskrutika Kannada is for students who speak ,read and write Kannada/Balake Kannada is for non-Kannada speaking, reading, and writing students.

**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L:T:P)can be considered as (3:0:2)or(2:2:2).The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

**21ISI410 Inter/Intra Institutional Internship**: All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory **21ISI410** Inter/Intra Institutional Internship of **03 weeks** during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students 'internship progress and interact with them for the successful completion of the internship.

**Non–credit mandatory courses(NCMC):**

**(A) Additional Mathematics I and II:**

**(1)** These courses are prescribed for III and IV semesters respectively to lateral entry Diploma holders admitted to III semester of B.E./B.Tech., programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In

such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

**(2)** Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**(3)** Successful completion of the courses Additional Mathematics I and II shall be indicated as **NP/PP** in the grade card. Non-completion of the courses Additional Mathematics I and II shall be indicated as unsatisfactory.

**(B)Placement Training:** These courses are prescribed for I and VI semesters respectively to the students of B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks ,he/she shall be deemed to have secured an **NP(not pass)** grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

**National Service Scheme /Physical Education (Sport and Athletics)/Yoga:**

**(1)** Securing 40% or more in CIE, 35% or more marks in SEE and 40% or more in the sum total of CIE+SEE leads to successful completion of the registered course.

**(2)** In case, students fail to secure 35% marks in SEE, they have to appear for SEE during the subsequent examinations conducted by the University.

**(3)** In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks.

**(4)** Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.

**(5)**These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA ,but completion of the courses shall Be mandatory for the award of degree.

| **Ability Enhancement Course–III** | | | |
|---|---|---|---|
| **21IST3081** | Mastering MS-Office | **21IST3083** | UI/UX Design |
| **21IST3082** | C++ Programming | | |

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**Tentative Scheme of Teaching and Examination effective from the Academic Year 2022-23**

**IVSemester**

| Sl. No. | Course Category | Course Code | Course Title | Teaching Department (TD)/ Paper setting Board(PSB) | Teaching Hrs/ Week | | | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | S | Total | Duration (Hrs) | CIE Marks | SEE Marks | Total Marks | |
| 1 | BSC | 21MAT401 IS | Mathematics Course (Probability ,Statistics and Queuing Theory ) | Mathematics | 2 | 2 | 0 | 0 | 4 | 03 | 50 | 50 | 100 | 3 |
| 2 | IPCC | 21IST402 | Python Programming | ISE | 3 | 0 | 2 | 0 | 5 | 03 | 50 | 50 | 100 | 4 |
| 3 | IPCC | 21IST403 | Computer Networks | ISE | 3 | 1 | 2 | 0 | 6 | 03 | 50 | 50 | 100 | 4 |
| 4 | PCC | 21IST404 | Design and Analysis of Algorithms | ISE | 3 | 0 | 0 | 0 | 3 | 03 | 50 | 50 | 100 | 3 |
| 5 | PCC | 21ISL405 | Design and Analysis of Algorithms Lab | ISE | 0 | 0 | 2 | 0 | 2 | 03 | 50 | 50 | 100 | 1 |
| 6 | AEC | 21IST406 | Biology for Engineers | CHE, PHY | 2 | 0 | 0 | 0 | 2 | 02 | 50 | 50 | 100 | 2 |
| 7 | HSSC | 21HST4S07 21HST4B07 | Samskrutika Kannada Balake Kannada | HSS | 1 | 0 | 0 | 0 | 1 | 01 | 50 | 50 | 100 | 1 |
| | | OR | | | | | | | | | | | | |
| | | 21HST407 | Constitution of India, Professional Ethics(CIP) | | | | | | | | | | | |
| **8** | AEC | 21IST408X | Ability Enhancement Course – IV | TD: Concerned department PSB: Concerned Board | If offered as Theory Course | | | | | 01 | 50 | 50 | 100 | 1 |
| | | | | | 2 | 0 | 0 | | | | | | | |
| | | | | | If offered as Lab. Course | | | | | 02 | | | | |
| | | | | | 0 | 0 | 2 | | | | | | | |
| **9** | UHV | 21HST409 | Universal Human Values | Any Department | | | | | | 01 | 50 | 50 | 100 | 1 |
| **10** | INT | 21ISI410 | Inter/Intra Institutional Internship | Evaluation by the appropriate | Completed during the intervening period of II | | | | | 3 | 100 | - | 100 | 02 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | authorities | and III semesters by students admitted to first year of BE./B. Tech and during the intervening period of III and IV semesters by Lateral entry students admitted to III semester. | | | | | | | | | |
| **11** | HSSC | 21HSN411 | Professional skills | HSS | 1 | 0 | 1 | 0 | | 02 | 50 | -- | PP/NP | 0 |
| | | | | | | | | **Total** | | | **600** | **450** | **1000** | **22** |

**Course prescribed to lateral entry Diploma holders admitted to III semester B.E programs**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **12** | 21MAD412 | Additional Mathematics–I | Maths | 02 | 02 | -- | -- | -- | 100 | PP/NP | 100 | 0 |

**Note :BSC:** Basic Science Course, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT**–Internship, **HSSC:** Humanity and Social Science Courses ,**AEC**–Ability Enhancement Courses. **UHV:** Universal Human Value Course.
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**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L:T:P) can be considered as(3:0:2) or (2:2:2).The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

**Non–credit mandatory course(NCMC):**

**(A)Additional Mathematics –II:**

**(1)** Lateral entry Diploma holders admitted to III semester of B.E./ B.Tech., shall attend the classes during the IV semester to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

**(2)** Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**(3)** Successful completion of the course Additional Mathematics-II shall be indicated as satisfactory in the grade card. Non-completion of the courses Additional Mathematics-II shall be indicated as Unsatisfactory.

**(B)Placement Training:** These courses are prescribed for I and VI semesters respectively to the students of all B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an **NP (not pass)** grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

**Internship of 04weeks during the intervening period of IV and V semesters;** 21ISI413 **Innovation/Entrepreneur ship/ Societal based Internship.**

**(1)** All the students shall have to undergo a mandatory internship of **04 weeks** during the intervening period of IV and V semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the VI semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up /complete the internship shall be considered under F (fail) grade and shall have to complete during subsequently after satisfying the internship requirements.

**(2)** Innovation/ Entrepreneurship Internship shall be carried out at industry, State and Central Government /Non-government organizations (NGOs), micro, small and medium enterprises (MSME), Innovation centers, or Incubation centers. Innovation need not be a single major breakthrough; it can also be a series of small or incremental changes. Innovation of any kind can also happen outside of the business world.

Entrepreneurship internships offer a chance to gain hands-on experience in the world of entrepreneurship and helps to learn what it takes to run a small entrepreneurial business by performing intern duties with an established company. This experience can then be applied to future business endeavors. Start-ups and small companies are a preferred place to learn the business tack ticks or future entrepreneurs as earning how a small business operates will serve the intern well when he/she manages his/her own company. Entrepreneurship acts as a catalyst to open the minds to creativity and innovation. Entrepreneurship internships can be from several sectors, including technology, small and medium-sized, and the service sector.

**(3) Societal or social internship:** Urbanization is increasing on a global scale; and yet, half the world's population still resides in rural areas and is devoid of many things that urban population enjoys. The rural internship is a work-based activity in which students will have a chance to solve/reduce the problems of the rural place for better living.

| **Ability Enhancement Course–IV** | | | |
|---|---|---|---|
| **21IST4081** | **Introduction to R Programming** | | |
| **21IST4082** | **Web Technologies** | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST302** | | | | | | |
| Category | Integrated Professional Core Course (IPCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **03** | **00** | **02** | **00** | **05** | **60** | **04** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

**1.** To understand and apply minimization techniques for designing optimized digital circuits along with VHDL implementation.

**2.** To analyze and design cost effective combinational and sequential circuits for given problems.

**3.** To analyze and design a synchronous and asynchronous counter.

**4**. To understand basic structure of computer

**5.** Gain knowledge of memory system

**UNIT I** **8 hours**

**Combinational Logic Circuits:** Boolean Laws and Theorems ,Sum-of- Products Method, Truth Table to Kamaugh Map, Pairs, Quads, and Octets , Karnaugh Simplifications for 4 variables, Don't-care Conditions, Product-of-Sum, Product-of-sums Simplification

**Data-Processing Circuits:** Multiplexers, Demultiplexers, 1-of-16 Decoder, Encoders, Magnitude Comparator.

**Text book 1**: Ch 3: 3.1 to 3.9. Ch 4: 4.1,4.2,4.3,4.6,4.9,4.14

***Laboratory Components:***

1. Realize full adder using 3-to-8 decoder IC and 4 input NAND gates.
2. Given any 4-variable logic expression simplify using multiplexer IC.
3. Write VHDL/Verilog code to realize all the logic gates.
4. Given a Boolean expression , simplify it using K-Map .Write Verilog/VHDL code torealize simplified boolean expression.
5. Write the Verilog/VHDL code for a full adder. Simulate and verify it's working.
6. Write VHDL code for full subtractor. Simulate and verify its working.
7. Write the Verilog /VHDL code for an 8:1 multiplexer. Simulate and verify its working.
8. Write Verilog /VHDL code for two bit magnitude comparator.

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**UNIT II :** **8 hours**

**Flip-Flops:** Flip-flops: RS FLIP-FLOPs , Gated FLIP-FLOPs Edge- triggered RS FLIP-FLOPs, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIP-FLOPs, JK Master-slave FLIP-FLOPs; JK Master-slave FLIP- FLOP, Various Representations of FLIP-FLOPs, Conversion of FLIP-FLOPs: A Synthesis Example, HDL Implementation of Flip-flops.

**Text book 1**: Ch 8: 8.1 to 8.8, 8.10,8.12

**Registers:** Types of Registers, Applications of Shift Registers, Register Implementation using

HDL.
**Text book 1**: Ch 9: 9.1,9.7

***Laboratory Component:***

1. Design and implement a ring counter using 4-bit shift register IC 7495.
2. Write the Verilog/VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify it's working.
3. Write the Verilog/VHDL code for JK flip flop with negative triggering .Simulate and verify it's working.
4. Write the Verilog/VHDL code for switched tail counter. Simulate and verify it's working

**UNIT III** **7 hours**

**Counters:** Asynchronous Counters, Synchronous Counters, DecadeCounters ,Counter Design as a Synthesis problem.

.T1:Ch 10: 10.1,10.3,10.5,10.7,10.9

***Laboratory Component:***

1. Design and implement an asynchronous counter using decade counter IC 7490 to count up from 0 to n (n<=9).Display the count value on 7 segment LED display using BCD to 7 segment code converters IC.
2. Write the Verilog/VHDL code for mod-8 up counter. Simulate and verify it's working.

**UNIT IV** **8 hours**

**Basic Structure of Computers:** Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Instruction Set:CISC and RISC. Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language.

**Text book 2:Chapter 1-1.1,1.2,1.3,1.4,1.6.5,**

**Chapter 2-2.2,2.3,2.4,2.5,2.6**

**Lab Component:**

**1.** Demonstration of parts of computer.

**UNIT V** **8 hours**

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage.

**Text book 2:** Ch 5 – 5.1 to 5.7, 5.9.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** On completion of the course, student should be ableto:

CO1: Design and analyze combinational circuits and apply concept of Minimization of Boolean functions using K Map. Implement using VHDL code.

CO2:Design Sequential circuit using flip flops.

CO3: Design and analyze synchronous and asynchronous counters.

CO4: Analyze functional units of a computer, its operational concepts, addressing modes, internal organization of a system through practicing with an assembly language

CO5: Analyze and design of memory unit including SRAM, DRAM, cache mapping techniques and basics of virtual memory.

**TEXT BOOKS:**

**1.** Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 7th Edition, Tata McGraw Hill, 2011

**2.** Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

**REFERENCE BOOKS:**

**1.** Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata McGraw Hill, 2005.

2. Charles H. Roth: Fundamentals of Logic Design, Jr., 5th Edition, Thomson, 2004

**EBOOKS/ONLINE RESOURCES**

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. NPTEL:http://nptel.ac.in/courses/106106092/
4. http://freevideolectures.com/Course/2277/Computer-Organization#

**SCHEME FOR EXAMINATIONS:**

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | | | | | | | | | | 2 | 1 | |
| **CO2** | | 3 | 3 | 3 | | | | | | | | | 2 | | |
| **CO3** | | 3 | 3 | 3 | | | | | | | | | 2 | | |
| **CO4** | 3 | 3 | | | | | 3 | | | | | | 2 | | |
| **CO5** | 3 | 3 | 3 | 3 | | | | | | | | | 2 | | |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS-2022 -2023**

| Course Title | **UNIX AND SHELL PROGRAMMING** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST303** | | | | | | |
| Category | Integrated Professional Core Course (IPCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **03** | **00** | **02** | **00** | **05** | **60** | **04** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

1. To provide introduction to UNIX operating system and its File System.
2. Understand and execute the different types of UNIX commands related to files, processes and security.
3. Develop shell programs using command substitution, positional parameters and control structures.
4. Implementation of SED and AWK commands.
5. Develop simple programs using PERL and AWK scripts.

**UNIT I** **07 hours**

**Introduction:** The UNIX operating system, UNIX architecture, Features of UNIX, Command usage:- locating commands, internal and external commands, Man Browsing the manual pages ,Understanding the man documentation. **File system**: - The file, what is in a file name?, The parent child relationship ,The HOME variable: the Home directory, PWD: checking your current directory, CD: changing the current directory, mkdir : making directories, rmdir: removing current directories, absolute pathnames, relative pathnames, ls :listing directory contents, Unix file system. **Basic file attributes:** ls –l: listing file attributes, the –d option: listing directory attributes, file ownership, file permission , chmod: changing file permission, Directory permission, changing file ownership, chown, chgrp. **The vi editor:** vi basics, three modes of vi editor ,Input mode –entering and replacing text, Saving text and quitting –the ex mode, navigation, editing text, undoing last editing instructions, repeating the last command, searching for a pattern substitution. **The shell**: The shells interpretive cycle, shell offering, pattern matching. Escaping and quoting: Redirection: the three standard files,/dev/null and dev/tty: two special files, pipe, tee: creating a tee, Command substitution, Shell variables

**Text Book1**:Ch 1, Ch 2, Ch 3, Ch 4, Ch 5, Ch 6, Ch 7, Ch 8

**Laboratory Component:**

1 Demonstrate the UNIX commands –

a. To access information using: date, history, man, who, whoami, uptime, finger, cal.

b. To display contents of files using: cat, vi, more, head, tail, grep, cmp, wc

c. To manage files using : cp, ls, mv,rm, chmod, find

d. Directory handling utilities using cd, mkdir, rmdir, mv, pwd

**UNIT II** **08 hours**

**The process:** process basics, ps: process status, system process, mechanism of process creation, Internal and external commands, process states and zombies, running jobs in background, nice: job executing with low priority, killing processes with signals, Job control, at and batch: execute later,

cron: running jobs periodically, time: timing processes. **Customizing the environment:** The shell, environmental variables, the common environmental variables, aliases, in-line command editing , The initialization scripts. **More file attributes:** file systems and Inodes, hard links, symbolic links and ln, **t**he directory, umask: Default file and directory permission, modification and access times, find: locating files, **Simple filters:** the sample database, pr:printing files, head: displaying the beginning of a file, tail: displaying the end of a file, cut: slitting a file vertically, paste : pasting files, sort: ordering a file, uniq: locate repeated and non repeated lines, tr:translating characters.

**Text Book1**:Ch 9, Ch 10, Ch 11, Ch 12

**Laboratory Component:**

1 Demonstrate the UNIX commands –

a. Process management using: ps, tty, time, kill, nice, cron, nohup, job, at, batch, exit

b. Customizing user environment using: env, set, stty, alias, .profile

c. File system and protection: mkfs, fsck,ls-i, find, ln, umask

d. Simple filtering: pr, tr, head,tail,uniq,nl,cut,paste

**UNIT III** **09 hours**

**Filters using regular expression: grep**: searching for a pattern, Basic regular expression(BRE), Extended regular expression(ERE) and egrep. **sed:** the stream editor, line addressing, using multiple instructions, context addressing, writing selected lines to a file, text editing, substitution, basic regular expression. **Essential shell programming: s**hell script, read: making scripts interactive, using command line arguments, exit and exit status of command, logical operator && and || - conditional execution,t he if conditional, using test and [] to evaluate expressions**,** the case conditional, expr: computation and string handling , $0: calling a script by different names, while: looping, for: looping with a list , set and shift :manipulating the positional parameter, here the document , trap :interrupting a program, debugging shell script with set –x, sample validation and entry scripts.

**Text Book1**:Ch 13, Ch 14, Ch 21

**Laboratory Component:**

1.Write a shell script that accepts two file names as command line arguments,checks if the permissions for these files are identical and output common permissions, else print each file name followed by its permissions.

2.Develop a shell script which accepts valid login names as command line arguments and prints their corresponding home directories and the login shell.

3. Develop a Shell script to find out the factorial of a given number.

4.Using arrays develop a shell script to sort 'N' numbers using bubble sort

5. Design script to find out whether a given string is palindrome or not.

6. Write shell script to generate prime numbers between given two limits.

**UNIT IV** **07 hours**

**AWK**-advanced filter: Simple awk filtering, Splitting a line into fields, printf: formatting output, variables and expressions, The comparison operators, number processing, variables, The –f option : storing awk programs in a file, The BEGIN and END section, built in variables, arrays, functions, control flow – the if statement, looping with for, Looping with while.

**Text Book1**:Ch 18

**Laboratory Component:**

1. Write an awk program to print the contents of the file in the reverse order.

2. Develop an awk script to delete duplicated lines from a given text file.

3. Write an awk script to compute gross salary of an employee accordingly to rule given below.
   If basic salary is < 10000 then HRA=15% of basic & DA=45% of basic
   If basic salary is >=10000 then HRA=20% of basic & DA=50% of basic.

**UNIT V** **08 hours**

**Perl-the master manipulator:** Perl preliminaries, the chop function, variables and operators, the string handling functions, specifying filenames in command line, $-: the default variable, current line number ($.) and range operator (..), lists and arrays, foreach:looping through a list, split:, join,dec2bin.pl,grep,associative arrays, regular expressions and substitution, file handling, file tests, subroutines

**Text Book1**:Ch 19

**Laboratory Component:**

1. Write a Perl script to convert a binary number to decimal.
2. Develop a perl script to find the GCD of two given numbers.
3. Write a perl script to check whether a given year is leap year or not
4. Design a perl script to reverse each word in a given file.
5. Write a perl script to check whether a given number is palindrome or not.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** On completion of the course, student should be able to:

**CO1**: Describe the architecture and features of the UNIX operating system and distinguish it from other operating systems.
**CO2**: Demonstrate UNIX commands for file handling and process control
**CO3**: Analyze a given problem and apply requisite facets of shell programming in order to devise a shell script to solve the problem
**CO4**: Demonstrate different types of SED addressing and AWK filtering.
**CO5**: Develop PERL programs for string usage, file concept and arrays handling.

**TEXT BOOK:**

1.Sumitabha Das., Unix Concepts and Applications.,4th Edition., Tata McGraw-Hill Education 2006,ISBN:0-07-063546-3.

**REFERENCE BOOKS:**

1.Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming,1st Edition,2002-Cengage Learning – India Edition. 2009, ISBN-13: 978-0-534-39155-3.
2.Unix & Shell Programming, M.G. Venkateshmurthy, Pearson Education, 2005.

**EBOOKS/ONLINE RESOURCES**

1. https://www.tutorialspoint.com/unix_commands/links.htm
2. https://www.geeksforgeeks.org/introduction-to-unix-system/
3. https://www.javatpoint.com/unix-operating-system
4. https://www.youtube.com/watch?v=txRD_bK062Y&list=PLd3UqWTnYXOloH0vWBs4BtSbP84WcC2NY

**SCHEME FOR EXAMINATIONS:**

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 1 | 1 | | | | | | | | 1 | 1 | 1 |
| **CO2** | 3 | 3 | 2 | 1 | 2 | | | | | | | | 1 | 1 | 1 |
| **CO3** | 3 | 3 | 3 | 3 | 1 | | | | | | | | 2 | 2 | 2 |
| **CO4** | 2 | 2 | 2 | 2 | 1 | | | | | | | | 1 | 1 | 1 |
| **CO5** | 2 | 2 | 2 | 2 | 2 | | | | | | | | 2 | 2 | 2 |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **DATA STRUCTURES WITH C** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST304** | | | | | | |
| Category | Professional Core Course(PCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 03 | 01 | 00 | 00 | 04 | 52 | 03 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

1. To become familiar with the concept of pointers and its usage in dynamic memory allocation.
2. To study and understand the representation and implementation of linear data structures.
3. To classify and comprehend the consequences of using non linear data structures in implementing a system .
4. To identify the suitable data structure during application development
5. To gain knowledge of sorting, searching and hashing techniques

**UNIT I** **7 hours**

**Introduction:** Data Structures, Classifications (Primitive & Non Primitive),Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays.
**Array Operations**: Traversing, inserting, deleting, searching, and sorting.Multidimensional Arrays

**T 1: Ch 1: 1.2, Ch 2: 2.2 - 2.7 T 2: Ch 1: 1.1 - 1.4, Ch 3 : 3.1 - 3.3, 3.5, 3.7 , Ch 4: 4.1 - 4.9, 4.14**

**UNIT II** **7 hours**

**Stacks:** Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression.
**Recursion** - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi
**Queues:** Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues. Programming Examples.

**T 1: Ch 3: 3.1 -3.7 T 2: Ch 6: 6.1 -6.3, 6.5, 6.7-6.10, 6.12, 6.13**

**UNIT III** **9 hours**

**Linked Lists:** Definition, Representation of linked lists in Memory, Memory allocation; Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues.
**Applications of Linked lists** – Polynomials, Sparse matrix representation. Programming Examples.

**T 1: Ch 4: 4.1 – 4.6, 4.8 T 2: Ch 5: 5.1 – 5.10**

**UNIT IV** **8 hours**

**Trees:** Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations,Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-

Evaluation of Expression , Programming Examples, AVL Trees, AVL rotations, overview of Red Black trees and Tournament Trees

**T 1: Ch 5.1 –5.5, 5.7 T 2: Ch 7: 7.1 – 7.9**

**UNIT V** **8 hours**

**Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search.

Sorting and Searching: Insertion Sort, Radix sort, Address Calculation Sort. Sorting and Searching: Insertion Sort, Radix sort, Address Calculation Sort.

**Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

**T 1: Ch 7, Ch 8: 8.1,Ch 9: 9.1, 9.2, 9.3**

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:**

CO1: Implement pointers in memory allocation , data structure functions.

CO2: Classify common data structures and implement them.

CO3: Apply appropriate algorithm for problem solving after identifying the appropriate linear data structure.

CO4: Design efficient programs by choosing the most apt non linear data structure.

**TEXT BOOKS:**

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press,2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

**REFERENCE BOOKS:**

1. Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning,2014
2. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
4. A M Tenenbaum, Data Structures using C, PHI, 1989
5. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

**EBOOKS/ONLINE RESOURCES**

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

**SCHEME FOR EXAMINATIONS:**

Professional Core Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO2** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO3** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO4** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO5** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **DATA STRUCTURES WITH C LAB** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21ISL305** | | | | | | |
| Category | Professional Core Course(PCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 00 | 00 | 02 | 00 | 02 | 26 | 01 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

**1.** To understand design and implement the concept of stack using recursive techniques.
**2.** Implement the application of stacks in converting an expression from infix to postfix notation and evaluate postfix
**3**. Design common data structures and implement linear queue, circular queue, priority queue.
**4.** To understand the importance of implementing data structures like stacks using list, queues using linked list, doubly linked lists and circular linked list.
**5.** To traverse a non linear data structure like a Binary Search Tree.

## I. LIST OF PROGRAMS

1 Design develop and implement menu driven C program to perform following set of operations on Stack of integers (using array of maximum size MAX) i) Push ii) Pop iii) Display iv) Exit. The program should print appropriate messages for stack overflow, stack underflow, and stack empty.

2. Design , develop and implement a program in C to convert and print a given valid parenthesized or parenthesize free infix expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) , / (divide), % (mod) and ^ ( power) .

3. Design , develop and implement a program in C to evaluate a valid suffix/postfix expression using stack. Assume that the suffix/postfix expression is read as a single line consisting of positive single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide), % (mod) and ^ ( power) .

4. Design develop and implement menu driven C program to perform following set of operations on queue of integers using an array. i) Insert ii) Delete iii) Display iv) Exit. The program should print appropriate messages for queue overflow, queue underflow, and queue empty.

5. Design develop and implement menu driven C program to perform following set of operations on circular queue of integers using an array. i) Insert ii) Delete iii) Display iv) Exit.

The program should print appropriate messages for circular queue overflow, circular queue underflow, and circular queue empty.

6. Design, Develop and Implement a menu driven program in C for the following operationson Singly Linked List (SLL) of Student Data with the fields: *USN, Name, Branch, Sem, PhNo*

i. Create a SLL of N Students Data by using *front insertion*. i.
ii. Display the status of SLL and count the number of nodes in it
iii. Perform Insertion at End of SLL
iv. Perform Deletion at End of SLL
v. Exit

The program should print appropriate messages for dynamic stack overflow, underflow and empty.

7. Design, Develop and Implement a menu driven program in C for the following operationson Singly Linked List (SLL) of Student Data with the fields: *USN, Name, Branch, Sem, PhNo*

i. Create a SLL of N Students Data by using *front insertion*.
ii. Display the status of SLL and count the number of nodes in it
iii.Perform Insertion at End of SLL
vi. Perform Deletion at front end of SLL
v. Exit

The program should print appropriate messages for dynamic queue overflow, underflowand empty

8. Design, Develop and Implement a menu driven Program in C for the following operationson

Doubly Linked List (DLL) of Employee Data with the fields: *SSN, Name, Dept,Designation, Sal, PhNo*

i. Create a DLL of N Employees Data by using *end insertion*.
ii. Display the status of DLL and count the number of nodes in it.
iii. Perform Insertion and Deletion at End of DLL.
iv. Perform Insertion and Deletion at Front of DLL.
v. Exit

9. Design, Develop and Implement a menu driven Program in C for the following operationson

Binary Search Tree (BST) of Integers .

i. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2
ii. Traverse the BST in Inorder, Preorder and Post Order
iii. Search the BST for a given element (KEY) and report the appropriate message
iv. Exit

10. Design, Develop and Implement a Program in C for the following operations on SinglyCircular Linked List (SCLL) with header nodes. Represent and Evaluate a Polynomial:

$$P(x,y,z) = 6 x^2 y^2 z - 4 y z^5 + 3 x^3 y z + 2 x y^5 z - 2 x y z^3$$

**Note: Programs 2, 3, 6, 8, 9, 10 to be conducted with support of Virtual Lab .Weblink:**

https://cse01-iiith.vlabs.ac.in /
https://ds1-iiith.vlabs.ac.in/data-structures-1/

## II. OPEN ENDED QUESTIONS

**Design and implement a solution to the following in C**.

**1.** Design, Develop and Implement a menu driven Program in C for the following array operations.
i. Creating an array of N Integer Elements
ii. Display of array Elements with Suitable Headings
iii. Inserting an Element (ELEM) at a given valid Position (POS)
iv. Deleting an Element at a given valid Position (POS)
v. Exit.

**2.** Design, Develop and Implement a Program in C for the following operations on Strings. i.Read a main String (STR), a Pattern String (PAT) and a Replace String (REP)
ii. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in iii.STR with REP if PAT exists in STR. Report suitable messages in case PAT does not
exist in STR

**3.** Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes
i. Represent a Polynomial P(x,y,z)
ii. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z)
iii. Display the polynomial P (x,y,z)

**NOTE:**

1. Student is permitted to submit open ended solution to any other open ended question apart from the list above . But it has to be approved by the staff in charge.
2. In the examination each student picks one question from a lot of all 10 questions

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:**

CO1: Design and develop stack, an application providing solution to convert infix to postfix expression using stack and also design a solution to evaluate postfix expression.
CO2: Implement queues like linear queue, circular queue .
CO3: Design and develop solution to implement the following : singly linked list, stacks using linked list, queues using linked list, doubly linked list and circular linked list.
CO4: Design the solution to traverse a Non linear data structure like a Binary Search Tree.

**SCHEME FOR EXAMINATIONS:**
Professional Core Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO2** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO3** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO4** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **CO5** | 3 | 3 | | 3 | | | | | | 3 | | 3 | 3 | | |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **MASTERING MS OFFICE** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST3081** | | | | | | |
| Category | Ability Enhancement Course (AEC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 02 | 00 | 00 | 00 | 02 | 26 | 01 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 02 Hours** | | |

**COURSE OBJECTIVE:**

**1.** Understand the basics of MS office and prepare documents and small presentations.
**2.** Attain the knowledge about spreadsheet/worksheet with various options.
**3.** Create simple presentations using templates various options available.
**4.** Demonstrate the ability to apply application software in an office environment.
**5.** Use MS Office to create projects, applications.

**UNIT I** **5 hours**

**MS-Word** -Working with Files, Text – Formatting, Moving, copying and pasting text, Styles – Lists –Bulleted and numbered lists, Nested lists, Formatting lists. Table Manipulations. Graphics – Adding clip Art, add an image from a file, editing graphics, Page formatting - Header and footers, page numbers,Protect the Document, Mail Merge, Macros – Creating & Saving web pages, Hyperlinks.

**UNIT II** **6 hours**

**MS-Excel-** Modifying a Worksheet – Moving through cells, adding worksheets, rows and columns, Resizing rows and columns, selecting cells, Moving and copying cells, freezing panes - Macros – recording and running. Linking worksheets - Sorting and Filling, Alternating text and numbers with Auto fill, Auto filling functions. Graphics – Adding clip art, add an image from a file, Charts – Using chart Wizard, Copy a chart to Microsoft Word.

**UNIT III** **5 hours**

**MS-Power Point -**Create a Presentation from a template- Working with Slides – Insert a new slide, applying a design template, changing slide layouts – Resizing a text box, Text box properties, delete a text box - Video and Audio effects, Color Schemes & Backgrounds Adding clip art, adding an image from a file,Save as a web page.

**UNIT IV** **5 hours**

**MS-Access -** Using Access database wizard, pages and projects. Creating Tables – Create a Table in design view. Datasheet Records – Adding, Editing, deleting records, Adding and deleting columns Resizing rows and columns, finding data in a table & replacing, Print a datasheet. Queries - MS-Access.

**UNIT V** **5 hours**

**Microsoft Outlook-** Introduction, Starting Microsoft Outlook, Outlook Today, Different Views In Outlook,Outlook Data Files.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** At the end of the course the student will be able to:

CO 1: Prepare documents, spreadsheets, make presentations with audio, video and graphs and would be acquainted with internet.
CO 2: Create, edit, save and print documents with list tables, header, footer, graphic, Spellchecker, mail merge and grammar checker
CO 3: Attain the knowledge about spreadsheet with formula, macros spell checker etc.
CO 4: Demonstrate the ability to apply application software in an office environment.
CO 5: Use Google Suite for office data management tasks.

**EBOOKS/ONLINE RESOURCES**

**Weblinks and Video Lectures (e-Resources):**
1. https://youtu.be/9VRmgC2GRFE
2. https://youtu.be/rJPWi5x0g3I
3. https://youtu.be/tcj2BhhCMN4
4. https://youtu.be/ubmwp8kbfPc
5. https://youtu.be/i6eNvfQ8fTw
6. http://office.microsoft.com/en-us/training/CR010047968.aspx
7. https://gsuite.google.com/leaming-center
8. http://spoken-tutorial.org

**SCHEME FOR EXAMINATIONS:**
Ability Enhancement Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO2** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO3** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO4** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO5** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |

**Strength of correlation:** Low-1, Medium- 2, High-3

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **C++ Programming** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST3082** | | | | | | |
| Category | Ability Enhancement Course (AEC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 02 | 00 | 00 | 00 | 02 | 26 | 01 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 02 Hours** | | |

**COURSE OBJECTIVE:**

1. Understand concepts of Object Oriented Programming and design programs using classes and objects for C++ .
2. Construct applications to provide flexible options for the creation of new definitions for some of the operators.
3. Specifying mechanism of deriving a new class from older classes through inheritance.
4. Implement methods to select appropriate member function during run time.
5. Gain knowledge of exception handling**.**

| | |
|---|---|
| **UNIT I**<br>**Introduction:** Principles of object oriented programming**,** Beginning with C++,Tokens, Expressions and Control Structures, Function in C++<br><br>**Textbook 1: chapter 1:** 1.4 to 1.8 **Chapter 2** :2.1 to 2.8,Chapter 3:3.1 to 3.18 | **6 hours** |
| **UNIT II**<br>Function in C++,Classes and Objects<br>**Textbook 1: Chapter 4** :4.1 to 4.9 ,**Chapter 5**:5.1 to 5.16 | **6 hours:** |
| **UNIT III**<br>Constructor and Destructors, Operator Overloading<br>**Textbook 1: Chapter 6** :6.1 to 6.11 ,**Chapter 7**:7.1 to 7.8 | **5 hours** |
| **UNIT IV**<br>Inheritance: Extending Classes ,Pointers, Virtual functions and Polymorphism<br>**Textbook 1: Chapter 8** :8.1 to 8.11 ,**Chapter 9**:9.1 to 9.7 | **5 hours** |
| **UNIT V**<br>Managing Console I/O operation, Exception Handling<br>**Textbook 1: Chapter 10** :10.1 to 10.6 **Chapter 13**:13.1 to 13.7 | **4 hours** |

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:**

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

**CO1**: Demonstrate the need of using Object Oriented Programming in the real world

applications.

**CO2**: Design programs using classes and objects for C++.

**CO3**: Develop programs for automatic initialization and destruction of objects.

**CO4**: Apply concepts of Inheritance, Virtual functions and polymorphism during programming.

**CO5**: Develop applications on I/O operation and Exception handling.

**TEXT BOOKS:**


**1.** E Balagurusamy, Object Oriented Programming with C++.5th Edition,2011.


**REFERENCE BOOKS:**


**1.** Stanley B.Lippmann, Josee Lajore: C++ Primer, 4th Edition, Addison Wesley, 2005.
**2.** Paul J Deitel, Harvey M Deitel: C++ for Programmers, Pearson Education, 2009.
**3.** K R Venugopal, Rajkumar Buyya, T Ravi Shankar: Mastering C++, Tata McGraw Hill, 1999**.**
**4.** Sourav Sahay: Object-Oriented Programming with C++, Oxford University Press, 2006**.**
**5.** Herbert Schildt: C++ The Complete Reference, 4th Edition, Tata McGraw Hill, 2014


**EBOOKS/ONLINE RESOURCES**

1. http://www.nptel.ac.in
3. https://en.wikipedia.org

**SCHEME FOR EXAMINATIONS:**

Ability Enhancement Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | | 3 | 3 | | 2 | | | | | | | | 2 | 2 | 2 |
| **CO2** | 1 | 3 | 3 | | | 2 | 2 | | 3 | | 3 | | 2 | 2 | 2 |
| **CO3** | | 3 | 3 | | 3 | 3 | | | | | | | 2 | 2 | 2 |
| **CO4** | | 3 | 3 | | 3 | 3 | | | 3 | | | | 2 | 2 | 2 |
| **CO5** | | 3 | 3 | | 2 | 3 | | | | | | 3 | 2 | 2 | 2 |

**Strength of correlation:** Low-1, Medium- 2, High-3

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | UI/UX DESIGN | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | 21IST3083 | | | | | | |
| Category | Ability Enhancement Course (AEC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 02 | 00 | 00 | 00 | 02 | 26 | 01 |
| CIE Marks: 50 | SEE Marks: 50 | | Total Max. marks=100 | | Duration of SEE: 02 Hours | | |

**COURSE OBJECTIVE:**

1. Understand design process of digital product
2. To understand modeling user
3. To understand setting goals
4. To find user experience

| | |
|---|---|
| UNIT I<br>A Design Process for Digital Products | 5 hours |
| UNIT II<br>Modeling Users: Person and Goals | 5 hours. |
| UNIT III<br>Setting the Vision: Scenarios and Design Requirements; | 5 hours |
| UNIT IV<br>Designing the Product: Framework and Refinement; A Basis for Good Product Behavior | 5 hours |
| UNIT V<br>User Experience and Why It Matters? Meet the Elements; Understanding the Strategy Plan | 6 hours |

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES: On completion of the course, student should be able to:**

**CO1:** Understand design process of digital product

**CO2:** Model user goals.

**CO3**: Set goals/ Vision .

**CO4** : Apply the strategy

**TEXT BOOKS:**

1.Alan Cooper, About Face-Essential of the User Interface Design, Wiley, 4th edition, 2014
2.Jenifer Tidwell, Designing Interfaces, O'Reilly Media, 2nd edition, 2010.

**REFERENCE BOOKS:**

1.William Buxton, Sketching user experiences-getting the design right and the right design, Elsevier-Morgan Kaufmann, 2007.
2.Don Norman, The Design of Everyday Things - Revised and Expanded Edition, 2013.
3.Jesse James Garrett - The Elements of User Experience-User-Centered Design for the Web and Beyond, 2nd Edition, New Riders Press, 2010.
4.ACM, International Journal of Human-Computer Studies.

**SCHEME FOR EXAMINATIONS:**

Ability Enhancement Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | | | | 1 | 1 | | | | | | | 2 | 2 | 2 |
| **CO2** | 1 | | | | 1 | 2 | | | | | | | 2 | 2 | 2 |
| **CO3** | 1 | | | | 1 | 1 | | | | | | | 2 | 2 | 2 |
| **CO4** | 1 | | | | 2 | 2 | | | | | | | 2 | 2 | 2 |

**Strength of correlation:** Low-1, Medium- 2, High-3

# 4th semester syllabus

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - ISE – 2022 -2023**

| Course Title | **PYTHON PROGRAMMING** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST402** | | | | | | |
| Category | Integrated Professional Core Course (IPCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **03** | **00** | **02** | **00** | **05** | **60** | **04** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

1. To acquire programming skills in core Python.
2. To present Object Oriented concepts and implementation skills in Python.
3. To develop the skills of designing Graphical user Interfaces in Python.
5. To develop the ability to write database and threaded applications in Python.

**UNIT I** **07 Hours**

**Introduction to Python:** Features of Python, Python Virtual Machine (PVM), Writing Our First Python Program, Executing a Python Program, Getting Help in Python, Comments in Python, Doc Strings. **Datatypes in Python:** Built-in datatypes, The None Type, bool Datatype, Sequences in Python, Sets, Literals in Python, Determining the Datatype of a Variable, Characters in Python, User-defined Datatypes, Constants in Python, Identifiers and Reserved words, Naming Conventions in Python. **Operators in Python**: Arithmetic Operators, Assignment Operators, Unary minus Operator, Relational Operators, Logical Operators, Boolean Operators, Membership Operators, Identity Operators, Operator Precedence and Associativity, Mathematical Functions. **Input and Output:** Output statements, Various formats of The print(), Input Statements, Command Line Arguments. **Control Statements**: If Statement, If … else Statement, If … elif … else Statement, While Loop, For Loop, Infinite Loops, Nested Loops, Else Suite, Break Statement, Continue Statement, Pass Statement, Assert Statement, Return Statement.

**Text Book1: Ch 1, Ch 2, Ch 3, Ch 4,Ch 5 , Ch 6**

**Laboratory Component:**

1. Write a Python program to generate prime numbers in a given range.
2. Write a Python program to check whether a number is Armstrong number or not.
3. Write a Python program to count the number of digits, words, upper case and lower case letters in a given sentence.

**UNIT II** **07 Hours**

**Arrays in Python**: Creating an Array, Importing the Array Module, Indexing and Slicing on Arrays, Types of Arrays, Working with Arrays using numpy, Creating Arrays using linspace, logspace, arrange function, Creating Arrays using zeros() and ones() Functions, Mathematical Operations on Arrays, Comparing Arrays, Aliasing the Arrays, Slicing and Indexing in numpy Arrays, Dimensions of Arrays, Attributes of an Array, Reshape() Method, Flatten() Method, Working with Multi-dimensional Arrays, The array() Function, The ones() and zeros() Functions, The eye() Function, The reshape() Function, Matrices in numpy. **Strings and Characters**: Creating Strings, Length of a String, Indexing in Strings, Repeating the Strings, Concatenation of Strings, Checking Membership, Comparing Strings, Finding Sub Strings, Strings are Immutable, Replacing a String with another String, Splitting and Joining Strings, Checking Starting and Ending of a String, String

Testing Methods, Formatting the Strings, Sorting Strings. **Functions**: Defining a Function, Calling a Function, Returning Results from a Function, Returning Multiple Values from a Function, Positional Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Lambdas, Using Lambdas with filter(),map(),reduce() Function, Function Decorators, Generators. Structured Programming: Creating Own Modules in Python,Special Variable __name__,

**Text Book1: Ch 7,Ch 8,Ch 9**

**Laboratory Component:**

1. Write a python program to search an element using linear search.
2. Develop a Python program to check whether a given number is palindrome or not using function.
3. Write a Python program to generate first 'N' Fibonacci numbers using recursion.

**UNIT III** **09 Hours**

**Lists and Tuples**: Creating Lists using range() Function, Updating the Elements of a List, Concatenation of Two Lists, Repetition of Lists, Membership in Lists, Aliasing and Cloning Lists, Methods to Process Lists, Nested Lists, List Comprehensions, Tuples, Creating Tuples, Accessing the Tuple Elements, Basic Operations on Tuples, Functions to Process Tuples, Nested Tuples, **Dictionaries:** Operations on Dictionaries, Dictionary Methods, Using for Loop with Dictionaries, Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Ordered Dictionaries. **Introduction to OOPS**: Problems in Procedure Oriented Approach, Features of Object Oriented Programming System (OOPS), Classes and Objects, Encapsulation, Abstraction, Inheritance, Polymorphism, Classes and Objects, Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods, Passing Members of One Class to Another Class, Inner Classes, **Inheritance and Polymorphism**: Constructors in Inheritance, Overriding Super Class Constructors and Methods, Super() Method, Types of Inheritance, Method Resolution Order (MRO), Operator Overloading, Method Overloading, Method Overriding, Abstract Classes and Interfaces in Python.

**Text Book1: Ch 10,Ch 11,Ch12,Ch13,Ch14,Ch15**

**Laboratory Component:**

**1.** Write a Python program to add two matrices using lists.
2. Write a Python program to find the second smallest and second largest number in a list.
3. Develop a Python program to count the frequency of each character in a given sentence using dictionaries.
4. Write a Python program to demonstrate how a class is defined, object is created and methods are invoked.
5. Write a Python program to demonstrate single, multiple and multilevel Inheritance.

**UNIT IV** **09 Hours**

**Exceptions**: Errors in a Python Program, Exceptions, Exception Handling, Types of Exceptions, The Except Block, Assert Statement, User-Defined Exceptions, Logging the Exceptions. **Files in Python**: Types of Files in Python, Working with Text Files, Working with Binary Files, Pickle in Python, seek() and tell() Methods, Random Accessing of Binary Files using mmap, Running Other Programs from Python Program. **Regular Expressions in Python**: Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files, Data Structures in Python. **Date and Time**: The epoch, Date and Time Now, Formatting Dates and Times, Finding Durations using time delta, Comparing Two Dates, Sorting Dates, Stopping Execution Temporarily, Knowing the Time taken by a Program, Working with Calendar Module.

**Text Book1: Ch 16,Ch 17, Ch 18 ,Ch 19, Ch 20**

**Laboratory Component:**

1. Write a Python program to count number of lines, words and characters in a text file.
2. Develop a Python program to print each word present in a given file in reverse order.
3. Write a Python program to validate a USN of UG and PG student of VTU.
4. Develop a Python program to extract all the mail-id's present in a text file.
5. Write a Python program to count the frequency of each word present in a given file.

**UNIT V** **07 hours**

**Threads:** Differences between a Process and a Thread, Concurrent Programming and GIL, Uses of Threads, Creating Threads in Python, Thread Class Methods, Single Tasking using a Thread, Multitasking using

Multiple Threads, Thread Synchronization, Avoiding Deadlocks in a Program, Communication between Threads, Thread Communication using nofity() and wait() Methods, , Daemon Threads, Networking in Python **Graphical User Interface**: GUI in Python, The Root Window, Fonts and Colors, Working with Containers, Canvas, Frame, Widgets, Button Widget, Label Widget, Message Widget, Text Widget, Scrollbar Widget, Checkbutton Widget, Radiobutton Widget, Entry Widget, Spinbox Widget, Listbox Widget, Menu Widget, **Python's Database Connectivity**: Advantages of a DBMS over Files, Working with MySQL Database, Operations on rows of a Table, Creating Database Tables through Python, Working with Oracle Database in Python, Stored Procedures.

**Text Book1: Ch 21, Ch 22, Ch 23,Ch 24**

**Laboratory Component:**

1. Develop a Python program to create and execute two threads.
2. Develop a Python GUI program to add two integers and display their sum.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** On completion of the course, student should be able to:

- **CO1**: Demonstrate the understanding and usage of python scripting elements, python constructs, data types.
- **CO2** : Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.
- **CO3**: Demonstrate the understanding and usage of modules, files, exceptions and regular expressions.
- **CO4**: Implement object oriented concepts, database applications.
- **CO5**: Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and GUI applications.

**Textbooks:**

1. Dr. R. Nageswawa Rao, Core Python Programming, Dreamtech press, 2nd Edition 2018 (Chapter Numbers: 3,4,5,6,7, 8,9,10,11,16,17,18,22).

**Reference Books:**

1. Gowrishankar S. Veena A, Introduction to Python Programming, CRC Press Taylor & Francis Group, 1st Edition 2019.
2. Michael Urban and Joel Murach, Mike Murach Elizabeth Drake, Python Programming, 1st Edition, 2016.

**EBOOKS/ONLINE RESOURCES**

1. http://www.w3schools.com
2. http://docs.python.org
3. http://www.tutorialspoint.com
4. http://www.learnpython.org

**SCHEME FOR EXAMINATIONS:**

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | 1 | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 1 | 2 | 1 |
| **CO2** | 1 | 1 | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 1 | 2 | 1 |
| **CO3** | 2 | 2 | 3 | 1 | 3 | -- | -- | -- | -- | -- | -- | -- | 1 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | -- | -- | -- | -- | -- | -- | -- | 2 | 2 | 1 |
| **CO5** | 1 | 1 | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 2 | 2 | 1 |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **COMPUTER NETWORKS** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST403** | | | | | | |
| Category | Integrated Professional Core Course (IPCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **03** | **01** | **02** | **00** | **06** | 70 | **04** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVES:**

**1.** To understand basic concepts, topologies and OSI/TCP layers
**2.** Understand the working of different protocols.
**3.** To understand the working of various Network layer Routing algorithms & Transport layer services
**4.** To understand usage of application layer like DNS, Remote login, E-mail, FTP etc.

**UNIT I** **12 Hours**

**Data Communications :Introduction to** Data Communications; Network Models;; Layered tasks; The OSI Model and the layers in the OSI model; TCP / IP Protocol Suite.
**Digital & Analog Transmission: Data** signals; Digital Transmission; Analog Transmission
12 **hours**
**Textbook 1: Ch 1, Ch 2, Ch 3**
***Laboratory Components:*** **The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.**
1.Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2.Simulate a four node point-to-point network with the links connected as follows:
n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

**UNIT -II** **10 Hours**

Data Link Layer
Error detection and correction : Introduction to error detection / correction; Block coding; Linear block codes; Cyclic codes, Checksum.
Data Link control: Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels; HDLC; Point-to-point Protocol - framing, transition phases.
Multiple Access Random Access; Controlled Access; Channelization
**Textbook 1: Ch 10, Ch 11,Ch 12**
***Laboratory Components:***
***1.***Write a program for error detecting code using CRC-CCITT (16- bits).

**UNIT-III Network Layer** **10 Hours**

Logical Addressing IPv4 addresses, IPv6 addresses, Internet Protocol, Delivery, forwarding and Routing, Security
TextBook 1: Ch 19, Ch 20,Ch 22,Ch 30
***Laboratory Components:***

*1.* Write a programming java for distance vector algorithm to find suitable path for transmission
*2.* Implement Diffie -Hellman Key exchange algorithm in java.
*3.* Write a program in java for simple RSA algorithm to encrypt and decrypt the data.

**UNIT-IV Transport Layer** **10 Hours**

Process to process Delivery: UDP, TCP, SCTP, Congestion control and Quality of Service

**Textbook 1: Ch 23, Ch 24**

***Laboratory Components:***

***1.*** Write a program in Java for congestion control using leaky bucket algorithm.

**The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.**

1.Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

**Unit V -Application Layer, Network Management:** **10 Hours**

Domain Name System (DNS): Name Space, Domain name space, Distribution of name space , DNS in internet, Resolution, DNS messages, Types of record. Remote Login, E-mail: Architecture, user agent, Message Transfer Agent(SMTP),Message Access Agent: POP and IMAP. FTP
World Wide Web and HTTP: Architecture, web documents, HTTP: HTTP transaction, Network Management: SNMP.

**TextBook 1: Ch 25, Ch 26, Ch 27, Ch 28**

***Laboratory Components:***

**The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.**

1.Implement simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets
2.Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animatio videos**

**COURSE OUTCOMES:** On completion of the course, student should be able to:

**CO1:** Analyze and formulate components of computer networks.

**CO2:** Design and develop protocols for transmission at lower layers

**CO3:** Identify and develop routing algorithms for network layer.

**CO4:** Recognize and apply technology for transport layer services.

**CO5:** Demonstrate the knowledge of Computer networks for different applications

**TEXT BOOKS:**

**1.** Behrouz A. Forouzan: Data Communications and Networking, 5th Edition, Tata McGraw-Hill, 2012

**REFERENCE BOOKS:**

**1.** William Stallings: Data and Computer Communication, 8th Edition, Pearson Education,2007.
2.Larry L. Peterson and Bruce S. David: Computer Networks – A Systems Approach, 4thEdition, Elsevier, 2007.

3.Wayne Tomasi: Introduction to Data Communications and Networking, PearsonEducation, 2005

**EBOOKS/ONLINE RESOURCES**

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

**SCHEME FOR EXAMINATIONS:**

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

**MAPPING of COs with POs**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PS03** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | | | 2 | | | | | | | 2 | 2 | | 3 |
| **CO2** | 2 | 2 | 3 | 2 | | | | | 2 | | | 3 | | | |
| **CO3** | | | 3 | | 3 | | | | | | | | | | |
| **CO4** | | | 3 | | 3 | | | | | | | | 2 | | |
| **CO5** | | | 3 | | 2 | 3 | | | 3 | | | 3 | | | 3 |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

**DrAmbedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS-2022 -2023**

| Course Title | **DESIGN AND ANALYSIS OF ALGORITHMS** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | 21IST404 | | | | | | |
| Category | Professional Course Course (PCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **03** | **00** | **00** | **00** | **03** | **39** | **03** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVE:**

1. To introduce the concept of an algorithm and understand the methods for analysis.
2. To represent algorithmic time efficiency using different asymptotic notations.
3. Explore the various algorithm design techniques, the process of its design and analysis.
4. To solve problems using appropriate design techniques.
5. Understand concepts of space-time trade offs.

**UNIT I** **07 hours**

**Introduction:** Notion of Algorithm, Methods of specifying algorithm, Important problem types:Sorting searching string processing, graph problems,combinatorial problems,, Asymptotic Notations and Basic efficiency classes: Informal introduction ,O- notation, Ω-notation ,Θ- notation, Basic efficiency classes, Mathematical Analysis of Non-Recursive and RecursiveAlgorithms

**Brute Force**:Introduction, Bubble Sort, Sequential search

**Text Book 1:Chapter 1: 1.1,1.3 Chapter 2:2.2,2.3.2.4, Chapter 3:3.1,3.2**

**UNIT II** **08 hours**

**Divide and conquer:** General Method, Binary search,Recurrence equation for DAC, Finding Minimum and maximum,Merge Sort, Quick Sort

**Decrease-and-conquer:** Introduction, Depth First Search,Breadth First Search,Topological Sorting.

**Text Book 1 : Chapter 4, 4.1,4.2,4.3 Chapter 5:5.2,5.3**

**UNIT III** **09 hours**

**Greedy method:** The General Method, Knapsack Problem, Minimum cost spanning trees : Prim's Algorithm, Kruskal'sAlgorithm, Single Source Shortest Paths: Dijikstras Algorithm, Huffman trees

**Transform and Conquer:**Heaps and Heapsort

**Text Book 2: Chapter 4 :4.1,4.2,4.4; Text Book 1: Chapter 9 : 9.1,9.2,9.3,9.4 Chapter 6 : 6.4**

**UNIT IV** **07 hours**

**Dynamic Programming:** Computing binomial coefficient**,**Warshall's and Floyds algorithms, Knapsack problem, Travelling Sales person problem

**Backtracking**:N-Queen problem, sum of Subset Problem

**Text Book 1:Chapter 8 : 8.1,8.2,8.4, Ch 12:12.1 Text Book 2: Chapter 5: 5.9**

**UNIT V** **08 hours**

**Branch-and-Bound:** Assignment Problem, Traveling Sales man Problem

**Space and Time Tradeoffs**: Sorting by Counting : Comparison Counting sort ,Distribution Counting Horspool's algorithm

**NP-Complete and NP Hard problems**: P and NP problems,NP complete problems

**Text Book 1:** Chapter 11: 11.2 , Chapter 7:7.1,7.2 Chapter 10: 10.3 :

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES: On completion of the course, student should be able to:**

**CO1:** Determine performance of recursive and non- recursive algorithms.

**CO2:** Develop and analyze algorithms to solve problems using various design techniques.

**CO3**: Apply different design techniques to solve problems.

**CO4**: Determine solutions to optimization problems by applying suitable algorithm.

**CO5**: Solve problems associated with space–time tradeoffs

**TEXT BOOK:**

1. Anany Levitin: Introduction to the Design and Analysis of Algorithms, Second Edition,Pearson Education, 2009.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Computer Algorithms/ C++, 2nd Edition, University press, 2014

**REFERENCE BOOKS:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction toAlgorithms, 2nd Edition, PHI, 2006.
2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education

**EBOOKS/ONLINE RESOURCES**

**https://onlinecourses.nptel.ac.in/**

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | | | | | | | | | | | 2 | 1 | |
| **CO2** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | 1 | |
| **CO3** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | 1 | |
| **CO4** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | 1 | |
| **CO5** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | 1 | |

**Strength of correlation:** Low-1, Medium- 2, High-3

**DrAmbedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS-2022 -2023**

| Course Title | **DESIGN AND ANALYSIS OF ALGORITHMS LAB** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | 21ISL405 | | | | | | |
| Category | Professional Core Course (PCC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | **00** | **00** | **02** | **00** | **02** | **26** | **01** |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 03 Hours** | | |

**COURSE OBJECTIVES:**

1. To introduce various algorithm design techniques.
2. To design algorithms with specific technique and implement these algorithms using the appropriate technique.
3. To enhance the skill to debug programs.

**I. LIST OF PROGRAMS**

**Implement the following using C/C++/ GO Language :**

1. Design and implement an algorithm to Sort a given set of elements using DAC merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n and analyze the time complexity.
2. Print all the nodes reachable from a given starting node in a digraph using BFS method.
3. Obtain the topological ordering of vertices in a given graph using DFS method/ Source removal method
4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
5. Apply Prim’s algorithm to undirected graph and obtain minimum cost Spanning Tree.
6. Design and implement Heap Sort algorithm to arrange elements in desired order
7. Design and implement an algorithm to solve 0/1 Knapsack problem using dynamic programming.
8. Design and Implement Floyd’s algorithm for the All-Pairs- Shortest-Paths problem.
9. Design and implement an algorithm to solve N-Queen's problem using Back Tracking.
10. Design and implement Horspool’s algorithm.

Note: In the examination each student picks one question from the lot of all 10 questions.

I. OPEN ENDED

QUESTIONSDevelop / Simulate Following Game Applications:

1. Knapsack
2. Spanning Trees
3. Sum of Subset
4. Travelling Sales Person etc.

***NOTE:***

**1. STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE. BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**

***2. IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM A LOT OF ALL 10QUESTIONS***

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES: On completion of the course, student should be able to:**

**CO1:** Develop algorithms using different design techniques.

**CO2:** Implement the algorithms using C/C++.

**CO3**: Analyze the time complexity of algorithms.

**CO4**: Solve optimization problems by implementing suitable algorithm.

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | | | | | | | | | | | 2 | | |
| **CO2** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | | |
| **CO3** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | | |
| **CO4** | 3 | 3 | 2 | 3 | | | | | | | | | 2 | | |

**Strength of correlation:** Low-1, Medium- 2, High-3

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **R PROGRAMMING** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST4081** | | | | | | |
| Category | **Ability Enhancement Course (AEC)** | | | | | | |
| Scheme and Credits | | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 02 | 00 | 00 | 00 | 02 | 26 | 01 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 02 Hours** | | |

**COURSE OBJECTIVES:**

1. Explore and understand how R and R Studio interactive environment.
2. To learn and practice programming techniques using R programming.
3. Read Structured Data into R from various sources.
4. Understand the different data Structures, data types in R.
5. To develop small applications using R Programming

| | |
|---|---|
| **UNIT I** | **5 hours** |
| Setting up :Installing R, Starting R, Working directory, Writing scripts. R as a calculating Environment, Arithmetic, Variables, Functions, Vectors, Expressions and assignments, Logical expressions, Matrices | |
| **UNIT II** | **5 hours** |
| Basic programming: Introduction, Branching with if, Looping with for, Looping with while, Vector-based programming, Input and output:Text ,Input from a file, Input from the keyboard, Output to a file ,Plotting, | |
| **UNIT III** | **5 hours** |
| Programming with functions, Functions, Scope and its consequences, Arguments, Vector-based programming using functions, Recursive programming. Sophisticated data structures: Factors, Dataframes ,Lists, The apply family | |
| **UNIT IV** | **5 hours** |
| Better graphics: Introduction, Graphics parameters, Graphical augmentation, Mathematical typesetting, Permanence, Grouped graphs:lattice,3D plots. | |
| **UNIT V** | **6 hours** |
| Pointers to further programming techniques: Packages, Frames and environments, Debugging again, Identifying bottlenecks, Object-oriented programming, Manipulation of data, Compiled code | |

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:** On completion of the course, student should be able to:

**CO1:** Understand the fundamental syntax of R through readings, practice exercises.
**CO2:** Demonstrate, and write R code.
**CO3:** Apply critical programming language concepts such as data types, iteration,
**CO4:** Explore control structures, functions, and Boolean operators by writing R rograms and through examples
**CO5:** Design and Develop Solutions to problems using R programming

**TEXT BOOKS**

1. Jones, O., Maillardet. R. and Robinson, A. (2014). Introduction to Scientific Programming and Simulation Using R. Chapman & Hall/CRC, The R Series.

**REFERENCE BOOKS**

1. Michael J. Crawley, "Statistics: An Introduction using R", Second edition, Wiley,2015

**ONLINE RESOURCES**

1. Wickham, H. & Grolemund, G. (2018). for Data Science. O'Reilly: New York. Available for free at http://r4ds.had.co.nz

**SCHEME FOR EXAMINATIONS:**

Ability Enhancement Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 2 | | 2 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO2** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO3** | 3 | 2 | 2 | 3 | 3 | - | - | - | - | - | - | - | 1 | 1 | - |
| **CO4** | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 | 1 | 1 |
| **CO5** | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | 1 | 1 | 1 |

**Strength of correlation:** Low-1, Medium- 2, High-3

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **WEB PROGRAMMING** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21IST4082** | | | | | | |
| Category | Ability Enhancement Course (AEC) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 00 | 00 | 02 | 00 | 02 | 26 | 01 |
| **CIE Marks: 50** | **SEE Marks: 50** | | **Total Max. marks=100** | | **Duration of SEE: 02 Hours** | | |

**COURSE OBJECTIVE:**

1. Learn HTML , Learn XHTML tags with utilizations.
2. Know CSS with dynamic document utilizations.
3. Learn JavaScript with Element access in JavaScript.
4. Logically plan and develop web pages.

| |
|---|
| **UNIT** I Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **5 hours.** |
| **UNIT II** HTML and XHTML-I : Origins of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links. **6hours** |
| **UNIT III** HTML and XHTML-II **:** Lists, Tables, Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML**.** **5hours** |
| **UNIT IV** CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, Background images**.** **5 hours** |
| **UNIT V** Java Script – I: Object orientation and JavaScript; General syntactic characteristics; Primitives**,** Operations, and expressions; Screen output and keyboard input, Control statements, Object creation and Modification, Functions; **5 hours** |

**TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos**

**COURSE OUTCOMES:**

CO1: : Identify and relate the different terms associated with web technologies.

CO2: Design simple web pages using different tags of XHTML

CO3: Interpret CSS for dynamic documents

CO4: Evaluate different concepts of JavaScript

CO5 : Design a small project with JavaScript and XHTML.

**TEXT BOOKS:**

1. Robert W Sebesta, "Programming the World Wide Web", 6th Edition, Pearson Education, 2008.

**REFERENCE BOOKS:**

1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003.

**EBOOKS/ONLINE RESOURCES**

1. Fundamentals of WEB Programming: https://www.youtube.com/watch?v=DR9dr6gxhDM
2. HTML and XHTML: https://www.youtube.com/watch?v=A1XlIDDXgwg
3. CSS: https://www.youtube.com/watch?v=J35jug1uHzE
4. Java Script and HTML Documents: https://www.youtube.com/watch?v=Gd0RBdFRvF0

**SCHEME FOR EXAMINATIONS:**

Ability Enhancement Course shall be evaluated both by CIE and SEE

**MAPPING of COs with POs and PSOs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | 1 | 1 | | 1 | | | | | | | | 2 | 1 | 1 |
| **CO2** | | 2 | 2 | | 2 | 1 | | | | | | | 2 | 1 | 1 |
| **CO3** | | 2 | 2 | | 1 | | | | | | | | 2 | 1 | 1 |
| **CO4** | | 1 | 1 | | 1 | 1 | | | | | | | 2 | 1 | 1 |
| **CO5** | | 2 | 2 | | 2 | 2 | | | 1 | | | | 2 | 1 | 1 |

**Strength of correlation:** Low-1, Medium- 2, High-3

**Dr Ambedkar Institute of Technology, Bengaluru-56**
**Department of Information Science and Engineering**
**Scheme and Syllabus - CBCS – 2022 -2023**

| Course Title | **INTERSHIP -MASTERING MS OFFICE** | | | | | | |
|---|---|---|---|---|---|---|---|
| Course Code | **21ISI410** | | | | | | |
| Category | Inter/Intra Institutional Internship(INT) | | | | | | |
| Scheme and Credits | No. of Hours/Week | | | | | Total teaching hours | Credits |
| | L | T | P | SS | Total | | |
| | 00 | 00 | 00 | 00 | 3 weeks | 00 | 02 |
| **CIE Marks: 100** | **SEE Marks:-** | | **Total Max. marks=100** | | **Duration of SEE: -** | | |

**COURSE OBJECTIVE:**

**1.** Understand the basics of MS office and prepare documents and small presentations.
**2.** Attain the knowledge about spreadsheet/worksheet with various options.
**3.** Create simple presentations using templates various options available.
**4.** Demonstrate the ability to apply application software in an office environment.
**5.** Use MS Office to create projects, applications.

**Topics Covered:**

- **MS-Word**
- **MS-Excel**
- **MS-Power Point**
- **MS-Access**
- **Microsoft Outlook**

**EBOOKS/ONLINE RESOURCES**

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://youtu.be/9VRmgC2GRFE
4. https://youtu.be/rJPWi5x0g3I
5. https://youtu.be/tcj2BhhCMN4
6. https://youtu.be/ubmwp8kbfPc
7. https://youtu.be/i6eNvfQ8fTw
8. http://office.microsoft.com/en-us/training/CR010047968.aspx
9. https://gsuite.google.com/leaming-center
10. http://spoken-tutorial.org

**SCHEME FOR EXAMINATIONS:**

**21ISI410 Inter/Intra Institutional Internship:**

Completed during the intervening period of II and III semesters by students admitted to first year of BE./B. Tech and during the intervening period of III and IV semesters by Lateral entry students admitted to III semester**.**

All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory 21ISI410 Inter/Intra Institutional Internship of 03 weeks during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students 'internship progress and interact with them for the successful completion of the internship.

**COURSE OUTCOMES:** At the end of the course the student will be able to:

CO 1: Prepare documents, spreadsheets, make presentations with audio, video and graphs and would be acquainted with internet.
CO 2: Create, edit, save and print documents with list tables, header, footer, graphic, Spellchecker, mail merge and grammar checker
CO 3: Attain the knowledge about spreadsheet with formula, macros spell checker etc.
CO 4: Demonstrate the ability to apply application software in an office environment.
CO 5: Use Google Suite for office data management tasks.

**MAPPING of COs with POs and PSOs**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO2** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO3** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO4** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **CO5** | 2 | 2 | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 1 | | 2 |
| **Strength of correlation:** Low-1, Medium- 2, High-3 | | | | | | | | | | | | | | | |

# Detailed Scheme

## ACADEMIC YEAR 2022-2023

## Dr. Ambedkar Institute of Technology
## Bangalore

## V - VI (2020-2024 BATCH) (175Credits)

## B.E

## Department Of Information Science and Engineering

**Vision**

- To create **D**ynamic, **R**esourceful, **A**dept and **I**nnovative **T**echnical professionals to meet global challenges.

**Mission**

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

**DEPARTMENT VISION AND MISSION**

**Vision:**

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

**Mission:**

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

**PEO1:** Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

**PEO2:** Graduates will be equipped to enhance their knowledge through core engineering and latest technological skillsto promote lifelong learning.

**PEO3:** Graduates will be able to take up social, technical and entrepreneurial challengesin inter disciplinary and multi disciplinary fields.

## PROGRAM SPECIFIC OUTCOMES(PSOS)

**PSO1**:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

**PSO2:**Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

## PROGRAMME OUTCOMES (POs)

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

# Dr. Ambedkar Institute of Technology, Bengaluru-560 056
## SCHEME OF TEACHING AND EXAMINATION from Academic Year 2022-2023
## B.E Information Science and Engineering
## Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
## V SEMESTER

| Sl. No | Course and Course code | | Course Title | Teaching Department | Teaching Hours /Week | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | | | | | |
| **1** | **HS** | **18HS51** | **Intellectual Property Rights** | Hu | 3 | - | -- | 03 | 50 | 50 | 100 | 3 |
| **2** | **PC** | **18IS51** | Operating System | ISE | 3 | - | -- | 03 | 50 | 50 | 100 | 3 |
| **3** | **PC** | **18IS52** | Web Technologies | ISE | 3 | 2 | -- | 03 | 50 | 50 | 100 | 4 |
| **4** | **PC** | **18IS53** | Artificial Intelligence | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| **5** | **PC** | **18IS54** | Data base Management Systems | ISE | 4 | -- | -- | 03 | 50 | 50 | 100 | 4 |
| **6** | **PE** | **18IS55X** | **Elective -1** | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| **7** | **OE** | **18IS56X** | **Open Elective -A** | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| **8** | **PC** | **18ISL57** | Computer Networks Lab | ISE | -- | -- | 2 | 03 | 50 | 50 | 100 | 1 |
| **9** | **PC** | **18ISL58** | Data base Management System Lab | ISE | **--** | **--** | 2 | 03 | 50 | 50 | 100 | 1 |
| | | | | **TOTAL** | **22** | **2** | **4** | **27** | **450** | **450** | **900** | **25** |
| | | | | | | | | | | | | |
| **10** | **HS** | **18HS55** | **Placement Training** | **HU** | **02** | **--** | **--** | **03** | **50** | **-** | **50** | **PP/NP** |

**Note:Hu:Humanities , PC: Professional core, MC: Mandatory Course**
**PE: Professional Elective, OE: Open Elective,**

**Electives**

| **Course code** | **Professional Electives -1** |
|---|---|
| **18IS551** | Internet of things |
| **18IS552** | Unix System Programming |
| **18IS553** | Information systems |
| **18IS554** | Object-Oriented Modeling and Design |

**Open Elective -A**

**INTER-DEPARTMENTAL ELECTIVE OFFERED BY ISE**

| Subject Code | Subject Title | No. of credits |
|---|---|---|
| 18IS561 | Machine Learning | 3 |
| 18IS562 | Internet of Things | 3 |
| 18IS563 | Information Systems | 3 |

Open Elective -A

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department. Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

# Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2022-2023

**B.E Information Science and Engineering**

**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**

**VI SEMESTER**

| Sl. No | Course and Course code | | *Course Title* | Teaching Department | Teaching Hours /Week | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory **Lecture** | Tutorial | Practical/ Drawing | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | | | | | |
| 1 | HS | 18HS61 | **Management and Entrepreneurship** | Hu | 3 | - | -- | 03 | 50 | 50 | 100 | 3 |
| 2 | PC | 18IS61 | Automata theory and compiler design | ISE | 3 | 2 | -- | 03 | 50 | 50 | 100 | 4 |
| 3 | PC | 18IS62 | Machine Learning | ISE | 4 | -- | -- | 03 | 50 | 50 | 100 | 4 |
| 4 | PC | 18IS63 | Cloud Computing | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 5 | PE | 18IS64X | Professional Elective -2 | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 6 | OE | **18IS65X** | **Open Elective -B** | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 7 | PC | 18ISL66 | Machine Learning Lab | ISE | -- | -- | 2 | 03 | 50 | 50 | 100 | 1 |
| 8 | PC | 18ISL67 | Cloud Computing Lab | ISE | -- | -- | 2 | 03 | 50 | 50 | 100 | 1 |
| 9 | MP | 18ISM68 | Mini-project | ISE | | | | 03 | 50 | 50 | 100 | 2 |
| 10 | INT | 18ISI69 | Industry Internship | (To be carried out during the intervening vacations of VI and VII semesters ) | | | | -- | -- | -- | -- | -- |
| | | | | **TOTAL** | **19** | **2** | **4** | **27** | **450** | **450** | **900** | **24** |
| **11** | **HS** | **18HS66** | **Placement Training** | **Hu** | **02** | **--** | **--** | **03** | **50** | **-** | **50** | **PP/NP** |

**Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.**

**Internship:** All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A University examination will be conducted during VIII semester and prescribed credit are added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent University examination after satisfy the internship requirements

**Electives**

| Course code | Professional Electives -2 |
|---|---|
| 18IS641 | Advanced Java and J2EE |
| 18IS642 | Digital Image Processing |
| 18IS643 | Network and Cyber Security |
| 18IS644 | Mobile Application Development |

**Open Elective -B**

**INTER-DEPARTMENTAL ELECTIVE OFFERED BY ISE**

| Sub Code | Subject Title | No. of Credits |
|---|---|---|
| 18IS651 | Data Base Management System | 3 |
| 18IS652 | Web Technologies | 3 |
| 18IS653 | Unix and Shell Programming | 3 |

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

# V SEMESTER

| | INTELLECTUAL PROPERTY RIGHTS(2020-21) | | |
|---|---|---|---|
| | **Subject Code: 18HS51** | **No. of Credits: 3** | **No of lecture hours per week: 3 Hrs** |
| | **Exam Duration: 3HOURS** | **Exam Marks: 100** | **Total No. of lecture hours: 39hrs** |

**Course Objective:**

**1. The main objective of the IPR is to make the students to be aware of their innovative & creative rights & Protection of IPR.**

**2. To impart knowledge how to obtain & register their inventions & patenting their inventions & knowledge of creative works that can be protected under Copy Right.**

**3. To create awareness to prevent fraudulent use of Trade Mark& impart knowledge on Registrable Trade Mark, Rights of Registered Proprietor of TM& its protection& to promote creativity& aesthetic aspects being protected under Designs.**

**4.To inculcate knowledge on Geographical Indication of a product, its origin & its protection under Geographical Indication & Important GIs in India.**

**5.To enable students to have knowledge of Plagiarism ,Cyber Crimes & their impact on human society,its prevention & punishment under Information Technology.**

| Units | Syllabus Content | Hours |
|---|---|---|
| **1** | **INTRODUCTION:** Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights, Importance of human creativity in the present scenario, Provision of IPR under TRIPS and WTO. Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge. | **04** |
| **2** | **PATENT RIGHTS AND COPY RIGHTS—** Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence ,Register of Patents& Patent Offices,Patent Agent,Government use of Invention, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties.<br>**COPY RIGHT—**Origin, Definition &Subject matter of Copy Right, Author & Ownership of Copy Right, Rights conferred by Copy Right, Registration procedure, Assignment, Licence& Relinquishment of CopyRight, Term of Copy Right, Infringement, Remedies, Computer Software & Copy Right Protection | **10** |
| **3** | **TRADE MARKS—** Origin, Meaning & Nature of Trade Marks, Types, Features of Good Trade Mark,Trade Mark Registry & Register of Trade Mark,Registration of Trade Marks,Deceptive Similarity,Assignment & Transmission, Infringement & Remedies, Offences relating to Trade **Marks, Passing Off, Penalties.**<br>**DESIGN-** Meaning, Definition, Object, Registration of Design,Rights conferred by Registration, Cancellation of Registration, International convention of design- types and functions,Powers & duties of Controller.<br>Semiconductor Integrated circuits and layout design Act-2000. | **10** |
| **4** | **GEOGRAPHICAL INDICATION-----**Introduction, Meaning, Scope of Geographical Indication, Important GIs in India, Protection of GI,Registration | **06** |

| | | |
|---|---|---|
| | of GI, Role & Functions of Registrar of GI,Infringement & Remedies. | |
| **5** | **PLAGIARISM**-Meaning, Plagiarism with respect to IPR,Salient Features of ITAct 2000,Cyber crimes, Meaning, Types of Cyber Crime, Digital signature, Authorities to issue Digital Signature Certificate, E-Commerce. | **09** |

## Course outcomes:

**1. The students learn the property rights under IPR, kinds of IPR, their protection of creative & innovative Rights.**

**2.Students also learn the inventions patentable,their registration , protection & punishment for Infringement& knowledge of creative works, Authors right under Copy Right & its term & Infringement of Copy Right.**

**3.Students will have the knowledge of Registrable Trade Mark, Rights of Proprietor, Protection & prevention of fraudulent use of Trade Mark & learn aesthetic aspects that can be protected , Registered under Designs .**

**4.Students will be aware of Geographical Indication of a product , its origin , protection of GI s, Important GIs in India.**

**5.Students will get knowledge of plagiarism in their innovations which can be questioned legally, knowledge on Digital Signature ,Cyber crime & punishment under Information Technology .**

## TEXT BOOKS:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
3. IPR by P. Narayanan
4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.

| **Sub Title : OPERATING SYSTEMS** | | |
|---|---|---|
| **Sub Code: 18IS51** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week :3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. To analyze structure ,management, concepts of process scheduling and multithreading in operating system
2. To identify the various methods of causing deadlocks.
3. To describe the techniques for main memory management.
4. To analyze the file system interface, implementation and disk management.
5. To understand the Protection and security concepts in operating system.

| Unit No. | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Introduction**: What operating systems do, Computer-System Architecture,Operating System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, Protection and Security.<br>T1: Ch 1: 1.1 to 1.9.<br>**System Structures**: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Structure;<br>T1: Ch 2: 2.1 to 2.7.<br>**Processes**: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication; Multithreaded Programming: Multithreading Models;<br>T1: Ch 3: 3.1 to 3.4, Ch 4: 4.1 to 4.3. | 8 |
| **2** | **Process Synchronization**: The Critical Section Problem, Peterson‟s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples;<br>T1: Ch 5: 5.1 to 5.9.<br>**CPU Scheduling :**Scheduling Criteria , Scheduling Algorithms , Thread Scheduling, Multiple-Processor Scheduling , Real-Time CPU Scheduling ,Operating-System Examples.<br>T1: Ch 6: 6.1 to 6.7.<br>**Dead locks:** System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance and detection, Recovery from Deadlock<br>T1: Ch 7: 7.1 to 7.7. | 8 |
| **3** | **Memory Management Strategies**:<br>**Main Memory:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.<br>T1: Ch 8: 8.1 to 8.6.<br>Virtual Memory Management: Background, Demand Paging, Copy on Write, Page Replacement, Allocation of frames, Allocating Kernel Memory.<br>T1: Ch 9: 9.1 to 9.8 | 8 |
| **4** | **File System**: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection;<br>T1: Ch 11: 11.1 to 11.6. | 8 |

| | | |
|---|---|---|
| | **File-System Implementation**: File System Structure , File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.<br>T1: Ch 12: 12.1 to 12.7.<br>**Mass storage structures, protection:** Mass storage structures; Disk structure; Disk attachment, Disk scheduling; Disk management; Swap space management.<br>T1: Ch 10: 10.1 to 10.6 | |
| **5** | **Protection and Security**: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems.<br>T1: Ch 14: 14.1 to 14.8<br>The Security Problem, Program Threats ,System and Network Threats, Cryptography as a Security Tool , User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer-Security Classifications<br>T1:Ch 15 : 15.1 to 15.8 | 7 |

**TEXT BOOK:**

Abraham Silberschatz Peter Baer Galvin, Greg Gagne **- Operating System concepts,** , 9th edition, Wiley-India, 2012.

**REFERENCE BOOKS:**

1. D.M Dhamdhere – **Operating Systems:A Concept Based Approach**, 2nd Edition, Tata McGraw- Hill, 2002.
2. P.C.P. Bhatt **- Operating Systems**, 2nd Edition, PHI, 2006.
3. Harvey M Deital **- Operating Systems** –, 3rd Edition Wesley, 1990.

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes**

After the completion of the course students will be able to
**CO1:** Analyze thefundamental principles and concepts of operating systems.
**CO2:**Identify, analyze various synchronization technique, deadlocks.
**CO3:** Identify, analyze, apply the various algorithms for memory management.
**CO4:** Analyze issues related to file system, disk management, protection and security.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO2 |
| CO2 | PO1,PO2,PO3 |
| CO3 | PO1,PO3,PO4 |
| CO4 | PO1,PO4 |

| **Sub Title : WEB TECHNOLOGIES** | | |
|---|---|---|
| **Sub Code: 18IS52** | **No. of Credits:4=3 : 1 : 0 (L-T-P)** | **No. of lecture hours/week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 52** |

**Course Objectives:**

1. To create a web pages using XHTML using Cascading Style Sheets
2. To do data validation and user interaction using JavaScript
3. To create XML documents and provide styling to documents.
4. To develop website using AngularJS ,Node JS
5. To design web applications using the concepts of PHP

| Unit No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Basics of XHTML :** Basic syntax; Standard XHTML document structure; Basic text markup. Images; Hypertext Links; Lists; Tables; Forms; Frames; **Introduction to XML:** XMLSyntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying XML documents with CSS; XSLT style sheets; XML processors<br>**CSS:** Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images.<br>T1:Ch 2, Ch 3, Ch 7 | **10** |
| **2** | **JavaScript:** Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions.<br>T1: Ch 4 | **10** |
| **3** | **JavaScript and HTML documents:**<br>The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model<br>T1: Ch 5 | **10** |
| **4** | **Angular JS , Node JS:**<br>OVERVIEW: General features, Core Features, Concepts, Advantages of AngularJS, Disadvantages of AngularJS, AngularJS Directives, ENVIRONMENT, MVC ARCHITECTURE, Creating Angular JS Application, Executing AngularJS Application, How AngularJS Integrates with HTML, DIRECTIVES, EXPRESSIONS, CONTROLLERS, FILTERS, TABLES, HTML DOM, MODULES, FORMS<br>Node Js:Over view of Node Js, Node Js Vs Angular JS, NPM | 12 |

| | | |
|---|---|---|
| **5** | **PHP:** Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, Operations, and Expression, Output, Control Statements, Arrays, Form handling, Files, Cookies, Session Tracking. T1: Ch 11<br>**Web Application Design:** Real World Web Software Design, Principles of Layering, Software design patterns in the web context, Data and Domain patterns, Presentation patterns,<br>T2: Ch 14 | 10 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
Students will demonstrate the knowledge and the skills acquired with respect to:

**CO1**: Design simple web pages using different tags of XHTML and XML document and use the style sheet to display
CO2 : Validate and provide user functionality using JavaScript
CO3 : Use AngularJS, Node JS in your website development
**CO4**: Design and develop PHP programs to perform database access& session tracking.
**CO5**: Develop web application projects

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO3,PO4,PO5,PO6,PO10,PO11 |
| CO2 | PO2,PO3,PO5,PO6,PO9 |
| CO3 | PO1,PO5,PO9, PO11 |
| CO4 | PO1, PO5,PO9,PO10,PO11 |
| CO5 | PO5, PO6, PO8,PO10,PO11 |

**TEXT BOOKS:**
1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education, 2011.
2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1stEdition, Pearson education, 2015. (ISBN:978-9332575271)
3. https://www.javatpoint.com/angularjs
**REFERENCE BOOKS / WEBLINKS:**
1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson education, 2011.
2. Pro PHP and jQuery- JASON LENGSTORF,2010.
3. http://nptel.ac.in
4. http://www.w3schools.com/
5.

| Sub Title :ARTIFICIAL INTELLIGENCE | | |
|---|---|---|
| **Sub Code:18IS53** | **No. of Credits:3=3: 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. Understand about agent, behavior and structure
2. Learn different AI models and search strategies
3. Representation of knowledge and reasoning
4. Gain knowledge about learning strategies

| Unit No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems | 8 |
| **2** | Knowledge representation issues: Representations and mappings approaches to knowledge representation, Issues in knowledge representation. | 8 |
| **3** | Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. Using predicate logic: Representing simple facts in logic | 8 |
| **4** | Resolution, Natural Deduction, Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory | 8 |
| **5** | Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of course, the students will be able to:
**CO1**: Describe the modern view of AI as the study of agents that receive

percepts and perform actions.
**CO2**: Apply AI search Models and Generic search strategies.
**CO3**: Write Logic for representing Knowledge and Reasoning of AI systems.
**CO4**: Design different learning algorithms for improving the performance of AI systems.
**CO5**: Implement projects using different AI learning techniques

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2 |
| CO2 | PO1,PO2,PO12 |
| CO3 | PO1,PO2,PO4,PO6,PO12 |
| CO4 | PO1,PO2,PO3,PO4,PO12 |
| CO5 | PO1,PO2,PO3,PO4,PO6,PO12 |

**TEXT BOOKS:**

**1."Artificial Intelligence: A Modern Approach "** by Stuart Russel, Peter Norvig,

2nd Edition, Pearson Education, 2003.

**2."Artificial Intelligence**" by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata

MCGraw Hill 3rd edition. 2013

**REFERENCE BOOKS/WEBLINKS:**


1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).


**E Books:**


1. Practical Artificial Intelligence Programming With Java,Third Edition ,Mark Watson
2. Artificial Intelligence Lecture Notes MIT.


**MOOCs:**

1. Artificial Intelligence -http://www.nptelvideos.in/2012/11/artificial-intelligence.html

| **Sub Title : DATABASE MANAGEMENT SYSTEMS** | | |
|---|---|---|
| **Sub Code:18IS54** | **No. of Credits:4=4 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+** | **Total No. of Contact Hours :52** |

| | | |
|---|---|---|
| | **50 =100** | |

**Course Objectives:**

1. To analyze the basic concepts and architecture of DBMS.
2. To understand the conceptual and relational models to design databases.
3. To Create and manipulate a relational database using SQL.
4. To understand the normalization steps in database design and removal of data anomalies.
5. To acquire the knowledge of transaction processing, NoSQL and MongoDB concepts

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Introduction:** Introduction; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Classification of Database Management systems.<br>**Entity-Relationship Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.<br>TEXT 1 Chapter-1,2,7 | **12** |
| **2** | **Relational Model and Relational Algebra**: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra. Relational Database Design Using ER-to-Relational Mapping<br>TEXT1 Chapter- 3, 6.1,6.2,6.3,6.4,6.5, 9.1 | **10** |
| **3** | **SQL :Schema Definition, Basic Constraints and Queries:** SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Embedded SQL. Introduction to SQL Programming Techniques: Database programming issues and techniques, Embedded SQL, Dynamic SQL.<br>TEXT1 Chapter 4,5,13.1,13.2 | **10** |
| **4** | **DatabaseDesign: Functional Dependencies and Normalization:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal | **10** |

| | | |
|---|---|---|
| | Form.<br>Relational Database Schema Design Algorithms and further Dependencies: Properties of Relational Decompositions; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form<br>TEXT1 Chapter15,16 | |
| **5** | **Transaction Management:** Overview of Transaction Management**:** The ACID Properties, Transaction and schedules, Concurrent Execution of Transactions, Lock based concurrency control, performance of locking, Transaction support in SQL,Introduction to crash recovery,Concurrency control<br>**Introduction to NoSQL and MongoDB:** What is NoSQL? Why NoSQL? Benefit over RDBMS, Types of NoSQL Database, and NoSQL vs. SQL Comparison. What is MongoDB? Overview of MongoDB, Design Goals for MongoDB Server and Database, MongoDB Tools, MongoDB CRUD Concepts, MongoDB Datatypes<br>TEXT2 Chapter-16,17 | **10** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**

After completing the course the students are able to:
**CO1:** Analyze the database concepts, data models and design the ER model for real world applications.
**CO2:** Design a database schema for database application.
**CO3:** Develop complex queries using SQL to retrieve the information required from the database.
**CO4:** Apply normalization techniques to database.
**CO5:** Analyze the concepts of transaction processing, NoSQL and MongoDB

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO3,PO5 |
| CO2 | PO1,PO3,PO5 |
| CO3 | PO2,PO3, PO5, PO9 |
| CO4 | PO1,PO2,PO3 |
| CO5 | PO1, PO2, PO3,PO5 |

**TEXT BOOKS:**

1. Elmasri and Navathe: Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.
2. Raghu Ramakrishna and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.

**REFERENCE BOOKS/WEBLINKS:**

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006.
3. www.w3resources.com

| **Sub Title : INTERNET OF THINGS** | | |
|---|---|---|
| **Sub Code:18IS551** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours :39** |
| **Course Objectives**<br>1. To Learn the characteristics, designs,and challenges in the IoT<br>2. To Understand the key Technologies and protocols in IoT<br>3. To Analyze various Layers connectivity and motivation of IPV6 | | |

| | |
|---|---|
| 4. | To Illustrate the role of IoT in various domains of Industry |
| 5. | Infer the role of Data Analytics in IOT |

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Introduction to IoT**<br>Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.Enabling IOT Technologies,IOT and M2M-Introduction, difference between IOT and M2M.<br>**T1:Chapter1-1.1,1.2,1.3,1.4 , Chapter3-3.1,3.2,3.3** | 8 |
| 2 | **Fundamentals IoT**<br>Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT Standards-Overview and Approaches,IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Lowpower,Zigbee.<br>**T2:Chapter4-4.1,4.2,4.3**<br>**T2:Chapter5-5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9** | 8 |
| 3 | **Layer ½ Connectivity**: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities,IPv6 Protocol Overview, IPv6 Tunneling.<br>**TEXT BOOK 2: Chapter6-6.1,6.2, Chapter7-7.1,7.2,7.3,7.4,7.5** | 8 |
| 4 | **Case Studies** Illustrating IoT Design-Introduction, Home Automation, Cities,Environment, Agriculture, Productivity Applications.<br>**T1:Chapter 9-9.1,9.2,9.3,9.4,9.5,9.6** | 8 |
| 5 | **Data Analytics for IoT**– Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring .<br>**T1:Chapter 10-10.1,10.2,10.3,10.4,10.5,10.6,10.7,10.8** | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course outcomes:**

On successful completion of the course, the student will be able to

**CO1**: Interpret the impact and challenges posed by IoT networks

**CO2**: Appraise the role of IoT protocols for efficient network communication

**CO3**: Deployment of different sensor technologies and Layers to connect the network.

**CO4**: To Deploy the role of IoT design in various domains of Industry

**CO5**:Elaborate the need for Data Analytics .

| COs | Mapping with PO's |
|---|---|
| CO1 | PO3,PO4,PO5,PO6,PO9,PO10 |
| CO2 | PO3,PO4,PO5,PO6,PO7,PO9,PO10 |
| CO3 | PO4,PO6,PO7,PO8,PO9,PO11 |
| CO4 | PO4,PO5,PO8,PO9,PO10,PO11 |
| CO5 | PO4,PO5,PO6,PO7,PO9,PO10 |

**TEXT BOOK:**

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things : A Hands on Approach" Universities Press., 2015

2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications", Wiley, 2013

**REFERENCE BOOKS/WEBLINKS**

1.Michael Miller," The Internet of Things", First Edition, Pearson, 2015.

2.Claire Rowland,Elizabeth Goodman et.al.," Designing Connected Products", First Edition,O'Reilly, 2015

| **Sub Title : UNIX SYSTEMS PROGRAMMING** | | |
|---|---|---|
| **Sub Code:18IS552** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Know the operating system standards like POSIX standards.
2. Comprehend UNIX internal-kernel structures.
3. Design & develop UNIX commands & applications using UNIX system API's.
4. Understand the UNIX process control mechanism.
5. Analyze the problem & apply the relevant IPC techniques in UNIX system programming.
6. Adopting signals as IPC for efficient low level and high level application development on Unix systems.

| UNIT No. | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Introduction:** UNIX and ANSI Standards:The ANSI C Standard, The ANSI/ISOC++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. T2:Ch 1,Ch 5,Ch 6 | 8 |
| 2 | **UNIX Files:** File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.**UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. T2:Ch 7,Ch 8,Ch 9 | 8 |
| 3 | **UNIX Processes:** The Environment of a UNIX Process:Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. T1:Ch 7,Ch 8 | 8 |
| 4 | **Process Control:** Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups. T1:Ch 9,Ch 10 | 8 |
| 5 | **Signals and Daemon Processes:** Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers.Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model. **Interprocess Communication – 1:** Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. T1:Ch 11,Ch 12. | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**

**Assignment -III from Unit 5**

**Course Outcomes:**

After completion of course students will be able to

**CO1:** Understand the fundamentals of UNIX operating system such as the POSIX standards, . UNIX processes, UNIX file system and Signals.
**CO2** :Analyze UNIX kernel level support for UNIX processes, UNIX filesystem and Signals.
**CO3** : Demonstrate advanced UNIX features such as signals, Job Control, daemon processes and inter Process communication.
**CO4** : Develop UNIX commands, utilities and applications utilizing UNIX System calls.
**CO5** : Analyze process control, Deamon characteristics, coding rules and error logging and IPC facilities

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO3,PO5 |
| CO2 | PO2,PO3,PO5 |
| CO3 | PO2,PO3,PO5 |
| CO4 | PO2,PO3,PO4,PO5 |
| CO5 | PO2,PO3,PO4,PO5 |

**TEXT BOOKS:**

1. Terrence Chan: UNIX System Programming Using C++, Pearson India, 2015.
2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 3rd Edition, Pearson Education, 2015.

**REFERENCE BOOKS / WEBLINKS:**

1. Maurice JBach :Advanced UNIX Programming, 2nd Edition, Pearson Education, 2015.
2. UNIX kernel Internals –UreshVahlia PHI 2010.
3. www.tutorialspoint.com/unix/unix-basic-operators.html
4. https://www.youtube.com/watch?v=DpcCtaaGxyQ&list=PLd3UqWTnYXOmKXhD-PVqMN1XhNQV-s4lj

| **Sub Title : INFORMATION SYSTEMS** | | |
|---|---|---|
| **Sub Code:18IS553** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Introduce to various types of information systems, issues and concepts related to it.
2. Understand about electronic and enterprise business system management.

| | |
|---|---|
| 3. | Familiarize the need and benefits of E-Business, ERP, E-Commence, SCM, DSS. |
| 4. | Comprehend the concept of IT planning and Managing the Information Systems. |
| 5. | Understand about Security management of IT, Enterprise and Global Management of IT. |

| UNIT No. | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Foundation concepts – 1:** Information Systems in Business: Introduction, The real world of Information Systems, Networks, What you need to know, The fundamental role of IS in business, Trends in IS, Managerial challenges of IT.<br>System Concepts: A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems<br>**Foundation Concepts – 2:** Fundamentals of strategic advantages: Strategic IT, Competitive strategy concepts, The competitive advantage of IT, Strategic uses of IT, Building a customer-focused business, The value chain and strategic IS, Reengineering business processes, Becoming an agile company Creating a virtual company, Building a knowledge-creating company.<br>T1: Ch 1, Ch 2 | 8 |
| 2 | **Electronic Business Systems:** Enterprise Business Systems: Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems.<br>Functional Business Systems: Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, Financial management systems.<br>**Enterprise Business Systems:** Customer relationship management: Introduction, What is CRM? Benefits and challenges of CRM, Trends in CRM.T1: Ch 7, Ch 8 | 8 |
| 3 | **Enterprise resource planning:** Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. Supply chain Management: Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM. **Electronic Commerce Systems:** Electronic commerce fundamentals: Introduction, The scope of e-commerce, Essential e-commerce, processes, and Electronic payment processes. E-commerce application trends, Business-to- Consumer e-commerce, Business-to-Business e-commerce, e-commerce marketplaces<br>T1: Ch 8, Ch 9 | 8 |
| 4 | **Decision Support Systems:** Decision support in business: Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, On-line analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support.<br>T1: Ch 10 | 8 |
| 5 | **Decision Support Systems contd:** Knowledge management systems, Business and Artificial Intelligence (AI).<br>**Security management of IT:** Introduction, Tools of security management, Internetworked security defenses, Other security measures, System Controls | 7 |

| | | |
|---|---|---|
| | and audits.<br>**Enterprise and Global Management of IT:** Managing IT: Business and IT, Managing IT, Business / IT planning, Managing the IS function.<br>T1: Ch 10, Ch 13,Ch 14 | |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course outcomes:**
After completing the course the students are able to:
**CO1**:Describe the role of information technology and information systems in business
**CO2:** Apply planning and maintenance strategies to the information systems
**CO3:**Interpret how to use information technologies such as ERP, E-Business and E-Commerce, m-Commerce, wireless networks, mobile computing etc. to solve business problems
**CO4:** Understand concepts of a Decision Support System (DSS) and its affect on management
**CO5:** Identify the threats to information security and protect information resources& to identify and propose Business/IT Solutions to the addressed problems.

| COs | Mapping with POs |
|---|---|
| CO1 | PO2,PO4.PO7 |
| CO2 | PO2,PO3,PO6,PO7,PO9,PO11 |
| CO3 | PO2,PO3,PO6,PO7,PO9,PO11 |
| CO4 | PO6,PO7,PO9 |
| CO5 | PO6,PO7,PO9,PO11 |

**TEXT BOOK:**

1. James A. O'Brien, George M. Marakas - Management Information Systems -10th edition, Tata McGraw Hill, 2010.

**REFERENCE BOOKS:**

1. Kenneth C. Laudon and Jane P. Laudon - Management Information System, Managing the Digital Firm -, 9th Edition, Pearson Education, 2006.
2. Steven Alter - Information Systems The Foundation of E-Business , 4th Edition, Pearson Education, 2002.
3. W.S. Jawadekar - Management Information Systems -, Tata McGraw Hill 1998.

| Sub Title : OBJECT-ORIENTED MODELING AND DESIGN | | |
|---|---|---|
| **Sub Code:18IS554** | **No. of Credits: 3=3 : 0 : 0 (L-T-P)** | **No.of Lecture Hours/Week 3** |
| **Exam Duration : 3 hours** | **Exam Marks :CIE +Assignment + SEE = 45 + 5 + 50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. Introduce students with the concept and terms used in Object Oriented Modelling .
2. Understand the importance of Object Oriented approach and UML notation .
3. Develop an understanding of Class, State and Interaction models.
4. Design and develop a system with Object Oriented approach.



| Unit No | Syllabus Content | No of Hours |
|---|---|---|

| | | |
|---|---|---|
| **1** | **Introduction:** What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history<br>**Modeling Concepts:**Modeling as Design Technique: Modeling; abstraction; The three models.<br>**Class Modeling**: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model ,practical tips.<br>Text:1.1-1.5,2.1-2.3,3.1-3.4,3.6 | **8** |
| **2** | **Advanced Class Modeling**: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes , Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages.<br>**State Modeling**: Events, States, Transitions and Conditions; State diagrams; State diagram behavior.<br>**Advanced State Modeling:** Nested state diagrams; Nested states; Signal generalization; Concurrency; Relation of class and state models<br>Text:4.1-4.11,5.1-5.5,6.1-6.6 | **8** |
| **3** | **Interaction Modeling:** Use case models; Sequence models; Activity models.<br>**Advanced Interaction Modeling:** Use case relationships; Procedural sequence models; Special constructs for activity models.<br>**Process Overview:** Development stages; Development life cycle.<br>**System Conception**: Devising a system concept; Elaborating a concept; Preparing a problem statement.<br>Text:7.1-7.3,8.1-8.3,10.1,110.2,11.1-11.3 | **8** |
| **4** | **Domain Analysis**: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.<br>**Application Analysis**: Application interaction model; Application class model; Application state model; Adding operations.<br>**System Design** Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.<br>Text:12.1-12.5,13.1-13.4,14.1-14.13 | **8** |
| **5** | **Class Design**: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.<br>**Implementation Modeling**: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.<br>Text:15.1-15.11,17.1-17.5 | **7** |

**Note 1: All units will have internal choice**

**Note 2: Three Assignments are evaluated for 5 marks:**

**Assignment – I from Units 1 and 2.**

**Assignment – II from Units 3 and 4**

**Assignment -III from Unit 5**

**Course Outcomes:**

**CO1:** Identify objects, attributes and operations performed on the objects in real world situations
**CO2:** Design class and state models for a given problem.
**CO3:** Analyze and build interaction models for the system to be developed.
**CO4:** Design System using class and application domain.
**CO5**: Implement system with OO approach.

| COs | Mapping with Pos |
|---|---|
| CO1 | PO1,PO2,PO3,PO7,PO12 |
| CO2 | PO1,PO2,PO3,PO4,PO12 |
| CO3 | PO1,PO2,PO3,PO4 |
| CO4 | PO1,PO2,PO3,PO4 |
| CO5 | PO1,PO2,PO3,PO4,PO7 |

**TEXT BOOK:**

Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.

**REFERENCE BOOKS/WEBLINKS:**


1. Grady Booch et al , Object-Oriented Analysis and Design with Applications -, 3rd Edition, Pearson, 2007.
2. Mark Priestley,Practical Object-Oriented Design with UML - 2nd Edition, Tata McGraw-Hill, 2003.
3. K. Barclay, J. Savage ,Object-Oriented Design with UML and JAVA -, Elsevier, 2008.
4. Booch, G., Rumbaugh, J., and Jacobson ,The Unified Modeling Language User Guide - 2nd Edition, Pearson, 2005.

**OPEN ELECTIVES**-A:

| **Sub Title: MACHINE LEARNING** | | |
|---|---|---|
| **Sub. Code:18IS561** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **CIE +Assignment +Group Activity + SEE = 45 + 5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course objectives:** This course will enable students to:

- Define machine learning and understand about various machine learning applications
- Differenciate supervised, unsupervised and reinforcement learning methods
- Apply decision trees, neural networks, Bayes classifier, Kmeans clustering and k-nearest neighbour methods for problems in machine learning

| Unit No. | Syllabus Content | No. of Hours |
|---|---|---|
| 1 | **INTRODUCTION TO MACHINE LEARNING:** Introduction; Human learning and types of human learning; What is machine learning?; Types of machine learning; Well-posed learning problems; Designing a learning system; Applications of machine learning; Tools in machine learning; Machine learning activities; Issues in machine learning.<br>**CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC** | **8** |

| | | |
|---|---|---|
| | **ORDERING:** Concept learning task; Concept learning as search; Find-S algorithm; Version spaces and the Candidate-elimination algorithm.<br>**Chapter 1: 1.1- 1.8 (T2) , 1.1-1.3 (T1) ; Chapter 2:2.1-2.5 (T1), 2.2 (T2)** | |
| **2** | **DECISION TREE LEARNING:** Decision tree representation; Appropriate problems for decision tree learning; Basic decision tree learning algorithm; Hypothesis space search in decision tree learning; Inductive bias in decision tree learning; Issues in decision tree learning;<br>**Chapter 3: 3.2-3.7 (T1)** | **8** |
| **3** | **LINEAR REGRESSION:**Notation (Model); Error term; Least square estimation of parameters. Batch Gradient Descent<br>**LOGISTIC REGRESSION:**Introduction; The Sigmoid; Learning in logistic regression; Cross-entropy loss function; Batch Gradient Descent<br>**Chapter 2: 2.1-2.2 (T3) ; Chapter 5: 5.1-5.4(T4)** | **8** |
| **4** | **ARTIFICIAL NEURAL NETWORKS:** Introduction; Neural Network representations; Appropriate problems for neural network learning; Perceptrons; Back propagation algorithm.<br>**BAYESIAN LEARNING-I:** Introduction; Bayes theorem; Bayes theorem and concept learning<br>**Chapter 4: 4.1-4.4 (Till 4.4.3), 4.5 (T1);Chapter 6: 6.1-6.3(Only 6.3.1) (T1)** | **8** |
| **5** | **BAYESIAN LEARNING-II:** Bayes optimal classifier; Naive Bayes classifier; Bayesian belief networks.<br>**CLUSTERING:** Introduction; K Means clustering<br>**Chapter 6: 6.7, 6.9, 6.11 (T1)** | **7** |

**Note 1: All chapters will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completion of course students will be able to:

**CO1:** Identify problems of machine learning and it's methods
**CO2:** Apply apt machine learning stratergy for any given problem
**CO3:** Design systems that uses appropriate models of machine learning
**CO4:** Solve problems related to various learning techniques

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1, PO2 |
| CO2 | PO3, PO4 |
| CO3 | PO2,PO3, PO5,PO12 |
| CO4 | PO4, PO9, PO12 |

**TEXT BOOKS:**


1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education. India Edition 2013.

2. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning" , Pearson India Education Services Pvt. Ltd., 2019.


**REFERENCE BOOKS/WEB LINKS:**


1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.

2. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1st edition, 2001.

3. Peter Harrington , "Machine Learning in Action", MANNING Shelter Island Publication, ISBN 9781617290183, 2012.


Weblinks:

1.NPTEL course by Balaram Ravindran

2.FAST.ai course on ML

| **Sub Title : INTERNET OF THINGS** | | |
|---|---|---|
| **Sub Code:18IS562** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours :39** |
| **Course Objectives**<br>1. To Learn the characteristics, designs,and challenges in the IoT<br>2. To Understand the key Technologies and protocols in IoT<br>3. To Analyze various Layers connectivity and motivation of IPV6<br>4. To Illustrate the role of IoT in various domains of Industry<br>5. Infer the role of Data Analytics in IOT | | |

| **UNIT No** | **Syllabus Content** | **No of Hours** |
|---|---|---|
| **1** | **Introduction to IoT**<br>Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.Enabling IOT Technologies,IOT and M2M-Introduction, difference between IOT and M2M.<br>**T1:Chapter1-1.1,1.2,1.3,1.4 , Chapter3-3.1,3.2,3.3** | **8** |
| **2** | **Fundamentals IoT**<br>Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT Standards-Overview and Approaches,IETF IPV6 Routing Protocol for RPL Roll, | **8** |

| | | |
|---|---|---|
| | Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Lowpower,Zigbee.<br>**T2:Chapter4-4.1,4.2,4.3**<br>**T2:Chapter5-5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9** | |
| **3** | **Layer ½ Connectivity**: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities,IPv6 Protocol Overview, IPv6 Tunneling.<br>**TEXT BOOK 2: Chapter6-6.1,6.2, Chapter7-7.1,7.2,7.3,7.4,7.5** | **8** |
| **4** | **Case Studies** Illustrating IoT Design-Introduction, Home Automation, Cities,Environment, Agriculture, Productivity Applications.<br>**T1:Chapter 9-9.1,9.2,9.3,9.4,9.5,9.6** | **8** |
| **5** | **Data Analytics for IoT**– Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring .<br>**T1:Chapter 10-10.1,10.2,10.3,10.4,10.5,10.6,10.7,10.8** | **7** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course outcomes:**
On successful completion of the course, the student will be able to
**CO1**: Interpret the impact and challenges posed by IoT networks
**CO2**: Appraise the role of IoT protocols for efficient network communication
**CO3**: Deployment of different sensor technologies and Layers to connect the network.
**CO4**: To Deploy the role of IoT design in various domains of Industry
**CO5**:Elaborate the need for Data Analytics .

| **COs** | **Mapping with PO's** |
|---|---|
| CO1 | PO3,PO4,PO5,PO6,PO9,PO10 |
| CO2 | PO3,PO4,PO5,PO6,PO7,PO9,PO10 |
| CO3 | PO4,PO6,PO7,PO8,PO9,PO11 |
| CO4 | PO4,PO5,PO8,PO9,PO10,PO11 |
| CO5 | PO4,PO5,PO6,PO7,PO9,PO10 |

**TEXT BOOK:**

3. ArshdeepBahga, Vijay Madisetti, ”Internet of Things : A Hands on Approach” Universities Press., 2015
4. Daniel Minoli, ”Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications”, Wiley, 2013

**REFERENCE BOOKS/WEBLINKS**

1.Michael Miller,” The Internet of Things”, First Edition, Pearson, 2015.

2.Claire Rowland,Elizabeth Goodman et.al.,” Designing Connected Products”, First Edition,O’Reilly, 2015

| **Sub Title : INFORMATION SYSTEMS** | | |
|---|---|---|
| **Sub Code:18IS563** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Introduce to various types of information systems, issues and concepts related to it.
2. Understand about electronic and enterprise business system management.
3. Familiarize the need and benefits of E-Business, ERP, E-Commence, SCM, DSS.
4. Comprehend the concept of IT planning and Managing the Information Systems.
5. Understand about Security management of IT, Enterprise and Global Management of IT.

| **UNIT No.** | **Syllabus Content** | **No of Hours** |
|---|---|---|
| **1** | **Foundation concepts – 1:** Information Systems in Business: Introduction, The real world of Information Systems, Networks, What you need to know, The fundamental role of IS in business, Trends in IS, Managerial challenges of IT.<br>System Concepts: A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems<br>**Foundation Concepts – 2:** Fundamentals of strategic advantages: Strategic IT, Competitive strategy concepts, The competitive advantage of IT, Strategic uses of IT, Building a customer-focused business, The value chain and | **9** |

| | | |
|---|---|---|
| | strategic IS, Reengineering business processes, Becoming an agile company Creating a virtual company, Building a knowledge-creating company.<br>T1: Ch 1, Ch 2 | |
| **2** | **Electronic Business Systems:**Enterprise Business Systems: Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems.<br>Functional Business Systems: Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, Financial management systems.<br>**Enterprise Business Systems:** Customer relationship management: Introduction, What is CRM? Benefits and challenges of CRM, Trends in CRM.<br>T1: Ch 7, Ch 8 | **7** |
| **3** | **Enterprise resource planning:** Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. Supply chain Management: Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM.<br>**Electronic Commerce Systems:** Electronic commerce fundamentals: Introduction, The scope of e-commerce, Essential e-commerce, processes, and Electronic payment processes. E-commerce application trends, Business-to- Consumer e-commerce, Business-to-Business e-commerce, e-commerce marketplaces<br>T1: Ch 8, Ch 9 | **9** |
| **4** | **Decision Support Systems:** Decision support in business: Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, On-line analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support.<br>T1: Ch 10 | **7** |
| **5** | **Decision Support Systems contd:** Knowledge management systems, Business and Artificial Intelligence (AI).<br>**Security management of IT:** Introduction, Tools of security management, Internetworked security defenses, Other security measures, System Controls and audits.<br>**Enterprise and Global Management of IT:** Managing IT: Business and IT, Managing IT, Business / IT planning, Managing the IS function.<br>T1: Ch 10, Ch 13,Ch 14 | **7** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course outcomes:**

After completing the course the students are able to:

**CO1**: Analyze the components, activities and strategies of Information system.

**CO2:** Apply planning and maintenance strategies to the information systems

**CO3:** Apply the technologies such as ERP, E-Business and E-Commerce, m-Commerce, wireless networks, mobile computing etc.

**CO4:** Identify the threats to information security and protect information resources.

**CO5:** To identify and propose Business/IT Solutions to the addressed problems.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO2,PO7,PO12 |
| CO2 | PO2,PO3,PO6,PO7,PO9,PO11 |
| CO3 | PO2,PO3,PO6,PO7,PO9,PO11 |
| CO4 | PO6,PO7,PO9,PO11 |
| CO5 | PO6,PO7,PO9,PO11,PO12 |

**TEXT BOOK:**

1. James A. O'Brien, George M. Marakas - Management Information Systems -10th edition, Tata McGraw Hill, 2010.

**REFERENCE BOOKS:**

1. Kenneth C. Laudon and Jane P. Laudon - Management Information System, Managing the Digital Firm -, 9th Edition, Pearson Education, 2006.
2. Steven Alter - Information Systems The Foundation of E-Business , 4th Edition, Pearson Education, 2002.
3. W.S. Jawadekar - Management Information Systems -, Tata McGraw Hill 1998.

| Sub Title : COMPUTER NETWORKS LAB | | |
|---|---|---|
| **Sub Code: 18ISL57** | **No. of Credits:1 : 0:0:1(L-T-P)** | **No. of lecture hours/week :2** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE + SEE = 50 + 50 =100** | |

**Course Objectives:**

1. Construct sample networks with different topologies and configurations.
2. Analysis of the network behavior with respect to different parameters and conditions.
3. Build programs to implement error detection techniques and congestion control techniques.
4. Construct programs to build optimal routing table.
5. Build programs to implement the specified security algorithms

## I. LIST OF PROGRAMS

### PART A

**The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.**

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.

2. Simulate a four node point-to-point network with the links connected as follows:

n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

3. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

4. Implement simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets

5. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.

**PART-B**

**Implement the following in Java:**

1. Write a program for error detecting code using CRC-CCITT (16- bits).

2. Write a program for distance vector algorithm to find suitable path for transmission.

3. Implement Diffie-Hellman Key exchange algorithm.

4. Write a program for simple RSA algorithm to encrypt and decrypt the data.

5. Write a program for congestion control using leaky bucket algorithm.

**II. OPEN ENDED QUESTIONS**

**Develop/ Simulate the following applications:**

1. Shortest Path from source to destination

2. File Transfer

3. Remote Login

4. Any other network and/or security application.

5. Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.

**NOTE:**

**1.STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**

**2. STUDENT IS REQUIRED TO SOLVE ONE PROBLEM FROM PART-A AND ONE PROBLEM FROM PART-B. THE QUESTIONS ARE ALLOTTED BASED ON LOTS. BOTH QUESTIONS CARRY EQUAL MARKS.**

**Course Outcomes:**

After completing the course the students are able to:

**CO1:** Simulate a sample network on a virtual screen.
**CO2:** Design and **a**nalyze the network behavior against various parameters through simulation
**CO3:** Demonstrate error detection, routing protocol techniques
**CO4:** Implement an optimal routing table and apply security algorithms for a given network.
**CO5:** Demonstrate congestion control techniques.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO5,PO9,PO12 |
| CO2 | PO1,PO2,PO3,PO12 |
| CO3 | PO1,PO2,PO3,PO4,PO12 |
| CO4 | PO1,PO2,PO4,PO5,PO12 |
| CO5 | PO1,PO2,PO5,PO6,PO12 |

| **Sub Title : DATABASE APPLICATIONS LAB** | | |
|---|---|---|
| **SubCode: 18ISL58** | **No. of Credits:1=0: 0 : 1 (L-T-P)** | **No. of lecture hours/week : 2** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE + SEE = 50 + 50 =100** | |

**Course Objectives:**

1. To execute SQL commands.
2. To implement simple exercises on relational database schema.
3. To design a relational database schema for specific database application using SQL.
4. To apply the normalization procedure on relational database schema

1. Consider the customer-sale scenario given below. The primary keys are underlined and the data types are specified:
CUSTOMER(Cust id : integer, cust_name: string)
ITEM(item_id: integer, item_name: string, price: integer)
SALE(bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer)
For the above schema, perform the following:
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List all the bills for the current date with the customer names and item numbers
d) List the total Bill details with the quantity sold, price of the item and the final amount
e) List the details of the customer who have bought a product which has a price>200
f) Give a count of how many products have been bought by each customer
g) Give a list of products bought by a customer having cust_id as 5

h) List the item details which are sold as of today
i) Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
2 Consider the following schema for a Library Database:

BOOK(Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS(Book_id, Author_Name)
PUBLISHER(Name, Address, Phone)
BOOK_COPIES(Book_id, Programme_id, No-of_Copies)
BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)
Write SQL queries to
a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2019 to Jun 2019
c) Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
d) Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
e) Create a view of all books and its number of copies that are currently available in the Library.
3. Consider the Employee-pay scenario given below. The primary keys are underlined and the data types are specified:
EMPLOYEE(emp_id : integer, emp_name: string)
DEPARTMENT(dept_id: integer, dept_name:string)
PAYDETAILS(emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)
PAYROLL(emp_id : integer, pay_date: date)
For the above schema, perform the following:
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List the employee details department wise
d) List all the employee names who joined after particular date
e) List the details of employees whose basic salary is between 10,000 and 20,000
f) Give a count of how many employees are working in each department
g) Give a names of the employees whose netsalary>10,000
h) List the details for an employee_id=5
i) Create a view which lists out the emp_name, department, basic, dedeuctions, netsalary
j) Create a view which lists the emp_name and his netsalary

4. Consider the following relational schema for the Office of the Controller of Examinations Application.
Student (Rollno, Name, Dob, Gender, Doa, Bcode);
Implement a check constraint for Gender
Branch (Bcode, Bname, Dno);
Department (Dno, Dname);
Course (Ccode, Cname, Credits, Dno);

Branch_Course (Bcode, Ccode, Semester);
Enrolls (Rollno, Ccode, Sess, Grade);
For Example, SESS can take values **'MAY2019', 'DEC2019'** Implement a check constraint for grade Value Set **('S', 'A', 'B', 'C', 'D', 'E', 'U' );** Students are admitted to Branches and they are offered by Departments. A branch is offered by only one department. Each branch has a set of Courses (Subjects). Each student must enroll during a semester. Courses are offered by Departments. A course is offered only by one department. If a student is unsuccessful in a course he/she must enroll for the course during next session. A student has successfully completed a course if the grade obtained by is from the list **(A, B, C, D, and E).** A student is unsuccessful if he/she have grade **'U'** in a course.Develop a SQL query to

a) list details of Departments that offer more than 3 branches.
b) list the details of Departments that offer more than 6 courses.
c) list the details of courses that are common for more than 3 branches.
d) list students who got 'S' in more than 2 courses during single enrollment.
e) Create a view that will keep track of the roll number, name and number of courses, a student has completed successfully.

5.Consider the schema for Movie Database:
ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)
Write SQL queries to
a) List the titles of all movies directed by 'Hitchcock'.
b) Find the movie names where one or more actors acted in two or more movies.
c) List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).
d) Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
e) Update rating of all movies directed by 'Steven Spielberg' to 5.
6. Demonstrate the CRUD operations on Mongodb database.

## II.OPEN ENDED QUESTIONS

1. Develop the Database applications for any of the following:
1. customer-sales
2. Student Library
3. Employee-payroll
4. Video Library
5. Any Application
2. NO SQL Examples

**NOTE :**

1. **THE EXERCISES ARE TO BE SOLVED IN AN RDBMS ENVIRONMENT LIKE ORACLE OR DB2.**
2. **STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**
3. **IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM A LOT OF ALL 5 QUESTIONS AND STUDENT NEED TO DO EXTRA QUERIES ALSO.**

**Course Outcomes:**

After completing the course the students are able to:

**CO1**: Apply the underlying concepts of database technologies.
**CO2**:Design and implement a relational database schema for a given problem-domain using SQL/MongoDb.
**CO3**: Develop sophisticated queries to extract information from large datasets.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO3 |
| CO2 | PO3,PO4,PO5,PO9 |
| CO3 | PO4,PO5,PO9, PO12 |

# VI SEMESTER

| Sub Title: Management and Entrepreneurship | | |
|---|---|---|
| **Sub Code: 18HS61** | **No. of Credits : 3** | **No. of Lecture hours/week : 3** |
| **Exam Duration :3 hours** | **CIE + Assignment + SEE =100<br>45 + 5 + 50 = 100** | **Total No. of Contact Hours: 39** |

**Course Objectives :**

1. To help students understand the Management concepts & its evolution.
2. To impart the knowledge about various Managerial functions.
3. To make the student learn the Entrepreneurial process.
4. To understand the role of SSI in economic development and gain an insight of funding agencies.
5. To have a clear understanding of preparation of project & its screening.

| UNIT NO | Syllabus Content | No. of Hours |
|---|---|---|
| **1** | **MANAGEMENT:** Introduction- Meaning, characteristics of management, functions of Management- POSDCORB, Levels and Skills of Management, Roles of Managers Management as science or an art or profession, Management and Administration, Development of management thought -Early management approaches:Psychological Development, Bureaucratic, Scientific and Administrative, Human Relations Approach, Modern management approaches: Behavioral, Systems, Quantitative and Contingency Approach. | **07 Hours** |
| **2** | **PLANNING:** Meaning, Types of Plans (Single use & Standing plans), Steps in Planning process.<br>**ORGANIZING:** – Meaning, Types of organization (Line, Staff, Line & Staff, Matrix and Committee form)Departmentation(Functional, Product, Process, Territorial and Customer), Span of Control, MBO and MBE.<br>**STAFFING:** Meaning and importance of staffing, Sources of recruitment, process of selection.<br>**DIRECTING:** Meaning, **Leadership:** Definition, Leadership styles (Autocratic, Democratic, Charismatic, Laissez faire and Participative.) ***Introduction to motivation:*** Meaning & Definition – Maslow, Herzberg & McGregor's Theory X & Y. ***Communication***– Meaning, types, communication process and barriers of communication, ***Co-ordination*****:** Meaning and importance.<br>**CONTROLLING:** Meaning, steps in controlling, types of controlling.<br>***Case study discussion with respect to Indian context.*** | **08 Hours** |
| **3** | **ENTREPRENEUR**: Definition & Meaning, Characteristics, types of entrepreneurs(Imitative, Innovative, Fabian and drone), Intrapreneur-meaning, Difference between Entrepreneurs, Intrapreneur & Manager, Stages in Entrepreneurial process, barriers to entrepreneurs, Role of Entrepreneurs in economic development.<br>**Rural entrepreneurship**– Definition, challenges & opportunities. | **08 Hours** |

| | | |
|---|---|---|
| | **Women Entrepreneurs** – Definition, challenges, and Institutional support to Women Entrepreneurs in India<br>**Family Business:** Meaning and Definition, succession planning in family business and reasons for failure of family business.<br>**Corporate Social Responsibility**- Meaning, definition and benefits.<br>***Case study discussion with respect to Indian context.***<br>***Activity: Profile of successful entrepreneur.*** | |
| **4** | **MSME:** Definition of MSME (latest). **SMALL SCALE INDUSTRY**: Meaning, and definition, Characteristics, forms of ownership, sources of financing, Steps to start SSI, Problems faced by SSI. Introduction to GATT, WTO & LPG.<br>**Institutional Support**: ***Central level Institutions*** –KVIC, NSIC, SIDBI, EDI and NABARD. S***tate level Institutions***- DIC, KSFC, KIADB,TECSOK.<br>**STARTUP COMPANIES-**Meaning and Challenges. Make in India concept and MUDRA Bank Initiative.<br>***Activity for students: Schemes for startup companies.*** | **09 Hours** |
| **5** | **PREPARATION OF PROJECT:**<br>Project- Meaning, Project identification, Project selection, Project Appraisal, Project implementation. Project Report –Outline, Feasibility Study- –PESTLE and errors in preparation of project report.<br>.***Activity for students*:*Writing of a business plan.*** | **7 Hours** |

**Note: Every unit will have an internal choice question for SEE.**

**Course Outcomes :**

CO1 : The students will gain knowledge on management concepts & its evolution.
CO2 : The students will learn the application of managerial skills & attributes.
CO3 : The students will get an in depth knowledge of entrepreneurial process & contribute to the betterment of the society.
CO4 : Students will be able to compile information about setting up an MSME & explore the sources of funding agencies.
CO5 : Students will be able to identify business opportunities & design a project report.

| **Cos** | **Mapping with POs** |
|---|---|
| CO1 : | PO11 |
| CO2 : | PO10,PO11 |
| CO3 : | PO6 |
| CO4 : | PO11 |
| CO5 : | PO10 |

**RECOMMENDED BOOKS:**

1. Entrepreneurship and Management- S Nagendra and V S Manjunath- Pearson Publication 4 /e, 2009.
2. Principles of Management – PC Tripathi, and P N Reddy – Tata MacGraw Hill.
3. Entrepreneurship Development – Poornima M Charanthimath Pearson Education 2nd Edition.

**REFERENCE BOOKS:**

1. Dynamics of Entrepreneurial Development and Management-Vasant Desai-Himalaya Publishing House. Latest edition.
1. Entrepreneurship and management - Shashi k Gupta- Kalyani publishers, Latest edition.
Financial Management- Shashi k Gupta- Kalyani publishers, Latest edition.

| Sub. Title: AUTOMATA THEORY and COMPILER DESIGN | | |
|---|---|---|
| **Sub. Code: 18IS61** | **No. of Credits:4=3 : 1 : 0 (L-T-P)** | **No. of lecture hours/week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 52** |

**Course objectives:**

1.Introduce concepts in automata theory and to classify machines by their power to recognize languages.

2.To understand and design deterministic and non-deterministic finite automata, Regular languages.

3.To apply ideas and techniques discussed to various software designs. Recognize phases of compiler with respect to design.

| Unit No. | Syllabus Content | No. of Hours |
|---|---|---|
| **1** | **Introduction to Finite Automata:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Non-deterministic finite Automata; Finite automata with Epsilon-transitions.<br>**Regular expressions and LanguageS:** Regular expressions;; Minimization of automata<br>T1: Ch 1-Ch 4 | **10** |
| **2** | **Context-Free Grammars And Languages:** Context free grammars; Writing a Grammar; Parse trees; Ambiguity in grammars.<br>**Normal forms for CFGs:** Useless symbols, λ-productions, Unit productions, CNF, GNF.<br>T1:Ch 5: 5.1-5.4; Ch 7: 7.1 | **10** |
| **3** | **Pushdown Automata:** Definition of the Pushdown automata; Acceptance by empty stack and final state methods.<br>**Introduction To Turing Machine:** The standard Turing machine; Design of Turning machine.<br>T1:Ch 6: 6.1-6.2; Ch 8: 8.2-8.4 | **10** |
| **4** | **Introduction, Lexical analysis:** Language processors; The structure of a Compiler.<br>**Lexicalanalysis:** The Role of Lexical Analyzer.<br>**Syntax Analysis – 1:** Introduction; Top-down Parsing: Predictive parser.<br>T2: Ch 1, T2: Ch 3, Ch 4: 4.1, 4.3-4.4 | **10** |
| **5** | **Syntax Analysis – 2:**Bottom-up Parsing; Introduction to LR Parsing: Simple LR parser; More powerful LR parsers(CLR,LALR)<br>**Syntax-Directed Translation:** Syntax-Directed definitions; Evaluation order for SDDs.<br>**Intermediate Code Generation:** Variants of syntax trees; Three-address code.<br>**Code Generation:**Issues in the design of Code Generator; The Target language; Basic blocks and Flow graphs; Optimization of basic blocks<br>T2: Ch 4: 4.5-4.9 Ch 5: 5.1-5.2; Ch 6: 6.1-6.2; Ch 8: 8.1-8.5 | **12** |

**Note 1: All Units will have internal choice.**

**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2;**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completion of course students will be able to:
**CO1:** Analyze concepts in automata theory and classify machines by their power to recognize languages.
**CO2:** Impart the knowledge of models of computation.
**CO3:** Design grammar and recognizers for different formal languages.
**CO4:** Design and solve problems related to Pushdown Automata & Turing Machine.
**CO5:** Demonstrate the syntax analysis and error correction strategies in Compiler Design.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO3, PO5 |
| CO2 | PO2,PO3,PO4,PO5 |
| CO3 | PO3,PO4,PO5 |
| CO4 | PO3,PO4,PO5 |
| CO5 | PO2,PO3,PO4 |

**TEXT BOOKS:**

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2009.
2. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman, Compilers- Principles, Techniques and Tools - 2nd Edition, Addison-Wesley, 2010.

**REFERENCE BOOKS/WEB LINKS:**

1.John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.

2.Nandini Prasad K.S: Automata Theory and Computability, 1st Edition, Cengage Publication, 2019.

3.Peter Linz: An Introduction to Formal Languages and Automata, 5th Edition, Jones and Bartlett, New Delhi, India, 2011.
4.Nandini Prasad K S, Principles of Compiler Design - 3rd Edition, Elsevier Publication, 2014.

5.http://mapmf.pmfst.unist.hr/~milica/Matem_teorija_r/MTR_web/Introduction%20To%20Automata%20Theory.pdf

| Sub Title : MACHINE LEARNING | | |
|---|---|---|
| **Sub Code: 18IS62** | **No. of Credits: 4 =4:0:0** | **No. of lecture hours/week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 52** |

**Course objectives**: This course will enable students to:

1. Define machine learning and understand about various machine learning applications
2. Differentiate supervised, unsupervised and reinforcement learning methods
3. Apply decision trees, neural networks, Bayes classifier, Kmeans clustering and k-nearest neighbour methods for problems in machine learning

| Unit No. | Syllabus Content | No. of Hours |
|---|---|---|
| 1 | **INTRODUCTION TO MACHINE LEARNING:** Introduction; Human learning and types of human learning; What is machine learning?; Types of machine learning; Well-posed learning problems; Designing a learning system; Applications of machine learning; Tools in machine learning; Machine learning activities; Issues in machine learning.<br><br>**CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC ORDERING:** Concept learning task; Concept learning as search; Find-S algorithm; Version spaces and the Candidate-elimination algorithm.<br><br>**Chapter 1: 1.1- 1.8 (T2) , 1.1-1.3 (T1) ; Chapter 2:2.1-2.5 (T1), 2.2 (T2)** | **10** |
| 2 | **LINEAR REGRESSION:**Notation (Model); Error term; Least square estimation of parameters; Gradient Descent<br>**LOGISTIC REGRESSION:**Introduction; The Sigmoid; Learning in logistic regression; Gradient Descent<br>**DECISION TREE LEARNING:** Decision tree representation; Appropriate problems for decision tree learning; Basic decision tree learning algorithm; Issues in decision tree learning.<br><br>**Chapter 2: 2.1-2.2(T3); Chapter 5: 5.1-5.4(T4); Chapter 3: 3.2-3.4,3.7 (T1)** | **12** |
| 3 | **ARTIFICIAL NEURAL NETWORKS:** Introduction; Neural Network representations; Appropriate problems for neural network learning; Perceptron's; Back propagation algorithm.<br>**BAYESIAN LEARNING:** Introduction; Bayes theorem; Bayes theorem and concept learning; Bayes optimal classifier; Naive Bayes classifier; Bayesian belief networks.<br><br>**Chapter 4: 4.1-4.5 (T1);Chapter 6: 6.1-6.3(Only 6.3.1), 6.7, 6.9-6.1 (T1)** | **10** |
| 4 | **INSTANCE BASED LEARNING:** k-nearest neighbor learning<br>**INTRODUCTION TO:** Bagging and Boosting (To balance bias and | **10** |

| | | |
|---|---|---|
| | variance); Support Vector Machines (SVM); Random forests<br>**CASE STUDIES OF APPLICATIONS:** Weather forecasting, Stock market prediction, Real Time Sentiment Analysis, etc.<br>**Chapter 8:8.1-8.3 (T1)** | |
| **5** | **DEEP LEARNING:** Introduction<br>**CLUSTERING:** Introduction; KMeans clustering; Hierarchal Clustering<br>**REINFORCEMENT LEARNING:** Introduction; Learning task.<br>**Chapter 6:6.12 (T1); Chapter 13: 13.1-13.3 (T1)** | **10** |

**Note 1: All units will have internal choice.**
Demo will be given to the students on usage of Google Colab, TensorFlow; "Orange" and "Weka" tools.
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completion of course students will be able to:

**CO1:**Identify problems of machine learning and it's methods
**CO2:**Apply apt machine learning strategy for any given problem
**CO3:** Design systems that uses appropriate models of machine learning
**CO4:** Solve problems related to various learning techniques

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1, PO2 |
| CO2 | PO3, PO4 |
| CO3 | PO2,PO3, PO5,PO12 |
| CO4 | PO4, PO9, PO12 |

**TEXT BOOKS:**

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education. India Edition 2013.
2.Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning" , Pearson India Education Services Pvt. Ltd., 2019.
3.Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, "Introduction to Linear Regression Analysis" , Wiley publications, 5th edition, 2012.
4. Daniel Jurafsky & James H Martin, "Speech and Language processing". Copyright 2019

**REFERENCE BOOKS/WEB LINKS:**

1. Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Ed., PHI Learning Pvt. Ltd., 2013.
2. Peter Harrington , “Machine Learning in Action”, MANNING Shelter Island Publication, ISBN 9781617290183, 2012.

## Weblinks:

1. NPTEL course by Balaram Ravindran
2. Machine Learning course from Coursera by Andrew Ng
3. FAST.ai course on ML

| Sub Title : CLOUD COMPUTING | | |
|---|---|---|
| **SubCode:18IS63** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. To study the history and the fundamental concepts of Cloud Computing, Parallel, Distributed Computing.
2. To understand the concepts of Virtualization, Containers and Microservices for developing and deploying applications with cloud
3. To learn the concept of Cloud Computing Architecture and different Cloud Models.
4. To Understand cloud management and cloud security.
5. To impart open source cloud platforms for developing the applications
6. To become familiar with the different applications of Cloud Computing.

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Introduction to Cloud Computing:** Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments Computing Platforms and Technologies.<br>**Principles of Parallel and Distributed Computing:** Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing.<br>T1: Ch1: 1.1-1.3, Ch 2: 2.1-2.5 | 8 |
| **2** | **Virtualization:** Introduction, Characteristics of Virtualized Environments, Virtualization and Cloud Computing, Pros & Cons of Virtualization.<br>**Microservices, Dockers and Containers:** An Introduction to Microservices, Modular Architecture, Advantages and Disadvantages of Microservices. Docker Containers: Containers, Docker architecture and Components, The Power of Docker : A Simple Example<br>T1: Ch 3: 3.1-3.5, T2: Ch 1 & Ch5 | **9** |
| **3** | **Cloud Computing Architecture:** Introduction, Cloud Reference Model, Types of Clouds, Economics of the cloud, Open challenges.<br>T1: Ch 4: 4.1-4.5 | **7** |
| **4** | **Managing the Cloud:** Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards.<br>**Understanding Cloud Security:** Securing the Cloud, Securing Data, Establishing Identity and Presence.<br>T3: Chapter 11 & 12 | **8** |
| **5** | **Cloud Platforms in Industry:** Amazon Web Services, Google AppEngine. | **7** |

| | | |
|---|---|---|
| | **Cloud Applications:** Scientific Applications, Business and Consumer Applications.<br>T1: Ch 9: 9.1-9.2, Ch: 10: 10.1-10.2 | |

**Note 1: All chapters will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of course, the student will be able to:
**CO1:** Analyze core concepts and fundamentals of the Cloud Computing.
**CO2:** Identify mechanisms to support Cloud Infrastructure.
**CO3:** Analyze the reference models for Cloud Computing.
**CO4:** To manage the Cloud Environment& Cloud Security.
**CO5:** Develop applications and host on Cloud Environment.

| COs | Mapping with Pos |
|---|---|
| CO1 | PO4,PO5,PO10,PO11,PO12 |
| CO2 | PO1,PO2,PO4,PO7,PO8,PO9 |
| CO3 | PO2,PO3, PO4,PO5,PO9,PO10 |
| CO4 | PO3,PO4,PO5,PO7,PO8, PO9,PO10,PO11,PO12 |
| CO5 | PO4,PO5,PO6,PO7,PO8,PO10,PO11,PO12 |

**TEXT BOOKS AND WEBLINKS:**


1. Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi ,Mastering Cloud Computing , Tata McGraw Hill Education Private Limited, 2013.
2. Parminder Singh Kocher, Microservices and Containers, Addison Wesley, 2018
3. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010


**REFERENCE BOOKS:**


1. Dinkar Sitaram, Geetha Manjunath, Moving to the Cloud. Elsevier Publications, 2011.
2. Dr. Kumar Saurabh , Cloud Computing , Wiley India, 2011.

| Sub Title : ADVANCED JAVA AND J2EE | | |
|---|---|---|
| **Sub Code:18IS641** | **No. of Credits: 3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Identify the need for advanced Java concepts like Enumerations and Collections
2. Construct client-server applications using Java socket API.
3. Make use of JDBC to access database through Java Programs.
4. Adapt servlets to build server side programs.
5. Demonstrate the use of JavaBeans to develop component-based Java software

| Unit No. | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Enumerations, Autoboxing and Annotations(metadata):** Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations.<br>T1:Ch 12 | 7 |
| **2** | **The collections and Framework**: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces, Parting Thoughts on Collections. T1: Ch.17 | 8 |
| **3** | **String Handling** :The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction, charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals( ) Versus == , compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), | 08 |

| | | |
|---|---|---|
| | Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder T 1: Ch 15 | |
| **4** | **Background;** The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The 08 Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects T1: Ch 31, T2: Ch 11 | 08 |
| **5** | **The Concept of JDBC**; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions. T2: Ch 06 | 08 |

**Note 1: All Units will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2;**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**
**TEXT BOOK:**
1. Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2. Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.
**REFERENCE BOOKS:**
1. Y. Daniel Liang: Introduction to JAVA Programming, 7thEdition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.
3. Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

**Course Outcomes:**
After the completion of the course students will be able to
**CO1:** Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs
CO2:Build client-server applications and TCP/IP socket programs
CO3: Illustrate database access and details for managing information using the JDBC API
CO4: Describe how servlets fit into Java-based web application architecture
CO5:Develop reusable software components using Java Beans

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO2 |
| CO2 | PO1,PO2,PO3 |
| CO3 | PO1,PO3,PO4 |
| CO4 | PO1,PO4 |
| CO5 | PO1,PO2,PO3 |

| Sub. Title : DIGITAL IMAGE PROCESSING | | |
|---|---|---|
| **Sub.Code:18IS642** | **No. of Credits: 3 =3:0:0(L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **CIE + Assignment+Group activity+SEE = 40+5+5+50=100** | **Total No. of Contact Hours : 39** |

**Course objectives:**

The objectives of the course are :

1. To overview of Digital image processing
2.To gain knowledge of image enhancement.
3.To be aware of image restoration techniques.
4.To acquire knowledge of colour fundamentals and morphological image processing.

| Unit No. | Syllabus | No. of Hours |
|---|---|---|
| **1** | Introduction: What is Digital Image Processing, Origins of Digital Image Processing, Examples of fields that use DIP, Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial and Gray-level Resolution,Some Basic Relationships Between Pixels, Linear and Nonlinear Operations. | **8** |
| **2** | Image Enhancement in the Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.<br>Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering. | **8** |
| **3** | Image Restoration: A Model of the Image degradation/Restoration process, Noise Models, Restoration in the Presence of Noise Only– Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering ,Minimum Mean Square Error (Wiener) Filtering, Constrained Least Square Filtering, Geometric Mean Filter. | **8** |
| **4** | Color Fundamentals: Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation,Color Image Compression. Wavelets and Multiresolution Processing: Image Pyramids, Subband coding, The Haar Transform, Multiresolution Expansions, Wavelet Transforms in one Dimension, Fast Wavelet Transform, Wavelet Transforms in Two Dimensions, Wavelet Packets. | **8** |
| **5** | Image Compression: Fundamentals, Image Compression Models, Error-free (Lossless) compression, Lossy Compression<br>Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic | **7** |

| | | |
|---|---|---|
| | Morphological Algorithms. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation. | |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 10 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:**
At the end of the course, the students will be able to:
CO1:understand image processing concepts.
CO2: Analyze image enhancement techniques.
CO3:Choose image restoration applications.
CO4:Identify color fundamentals and its transformations.
CO5:Analyze morphological image concepts

**Text Books:** 1. Rafael C Gonzalez and Richard E. Woods: Digital Image Processing, PHI 2nd Edition 2005

**Reference Books:**


1. S. Sridhar, Digital Image Processing, Oxford University Press India, 2011.
2. K. Jain: Fundamentals of Digital Image Processing, Pearson, 2004.
3. Scott E. Umbaugh: Digital Image Processing and Analysis, CRC Press, 2014.
4. S. Jayaraman, S. Esakkirajan, T. Veerakumar: Digital Image Processing, McGraw Hill Ed. (India) Pvt. Ltd., 2013.
5. Anthony Scime, "Web Mining Applications and Techniques", Idea Group Publishing,2005.


**Sub Title : NETWORK AND CYBER SECURITY**

| Sub Code: 18IS643 | No. of Credits:3=3 : 0 : 0 (L-T-P) | No. of lecture hours/week : 3 |
|---|---|---|
| Exam Duration : 3 hours | Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100 | Total No. of Contact Hours :39 |

**Course Objectives:**

1. To gain knowledge of cryptography
2. To acquire knowledge of application protocols to provide security.
3. To gain knowledge of securing data in transit across networks.
4. To introduce the area of cybercrime and Cyber security to students .

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Classical Encryption Techniques** : Symmetric Cipher Model: Cryptography, Cryptanalysis and Brute-Force Attack.<br>Substitution Techniques:caeser cipher, monoalphabetic cipher, playfair cipher, hill cipher, polyalphabetic cipher, one-time pad<br><br>**Public-Key Cryptography** Principles of public-key cryptosystems: Public-key cryptosystems, Applications for public-key cryptosystems, requirements for public-key cryptosystems, public-key cryptanalysis. RSA algorithm,ECC<br>T1: Ch 1:1,2 Ch 8: 1,2 | 8 |
| 2 | **Electronic Mail Security**: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing.<br>T1:Ch 17: 1,2,3 | 8 |
| 3 | **IP Security:** IP Security overview: Applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes. Encapsulating Security payload: ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes<br>T1 :Ch 18:1,2,3 | 7 |
| 4 | **Transport Level Security:** Web security considerations: Web security threats, Web Traffic security approaches<br>Secure sockets layer: SSL architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert protocol, hand shake protocol<br>T1 : Ch 15: 1,2,3,4,5 | 8 |
| 5 | **Introduction to Cybercrime & Cyber security**: Introduction,Cybercrime:Definition and Origins of the word. Definition of Cyber Security. Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes. Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective. Cybercrime and the Indian ITA 2000. A Global Perspective on Cybercrimes. Cybercrime Era: Survival Mantra for the Netizens.<br>Cyberoffenses: How Criminals Plan Them: Introduction, How Criminals Plan the Attacks. Social Engineering, Cyberstalking, Cyber cafe and Cybercrimes. | 8 |

| | | |
|---|---|---|
| | Botnets: The Fuel for Cybercrime. Attack Vector. Cloud Computing.<br>T2 : Ch 1, Ch 2 | |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of the above course students will be able to
**CO1:** Apply the knowledge of symmetric and asymmetric technique for securing data.
**CO2:** Analyze Email Security aspects and application protocols .
**CO3:** Analyze security aspects and protocols of IP layer .
**CO4:** Secure data in transit across network by using appropriate protocol.
**CO5:** Acquire Knowledge on the cyber security, cybercrime.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO2,PO3,PO6 |
| CO2 | PO2,PO6 |
| CO3 | PO2,PO6 |
| CO4 | PO3,PO6,PO12 |
| CO5 | PO2,PO7,PO8,PO12 |

**TEXT BOOKS:**
1. William Stallings: Cryptography and Network Security, Principles and Practice Pearson, 6th edition 2014.
2. Sunit Belapure and Nina Godbole, " Cyber Security: Understandign Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN:978-81-265-2179-1. Publish Date 2013.

**REFERENCE BOOKS:**
1. Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, "**Cyber Security Policy Guidebook** " Wiley Publications .
2. Behrouz A. Forouzan: Cryptography and Network Security Tata-Macgraw Hill 2007

| Sub Title : MOBILE APPLICATION DEVELOPMENT | | |
|---|---|---|
| **Sub Code:**18IS644 | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment +Group Activity + SEE = 45 + 5+5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. To understand fundamentals of Android OS, and use appropriate tools for Android Application development.
2. To be familiar with managing of application resources to build elegant user interfaces with views, layouts & fragments
3. To design styling, and common design patterns found among applications
4. To understand storing of application data using preferences, files and directories, SQLite, and content providers.
5. Develop, test, debug and publish mobile applications using android Platform.

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Platform Overview:** Introducing Android – History of Mobile Software Development, The Open Handset Alliance, Android Platform Uniqueness, The Android Platform, Setting Up Your Android Development Environment - Configuring Your Development environment, Exploring the Android SDK. Creating first android application - Testing Your Development Environment, Building Your First Android Application.<br>**Application Basics :** Understanding Application Components - Mastering Important Android Terminology, The Application Context, Performing Application Tasks with Activities, Organizing Activity Components with Fragments, Managing Activity Transitions with Intents<br>TB1: Ch1, Ch2, Ch3,ch4 | 7 |
| 2 | **Application Basics Continued** – Defining the Manifest , Managing Application Resources- What Are Resources?, Adding Simple Resource Values in Android Studio, Working with Different Types of Resources, Working with Layouts, Exploring Building Blocks, Positioning with Layouts, Partitioning with Fragments<br>TB1: Ch5,ch6,ch7,ch8,ch9 | 9 |
| 3 | **Application Design Essentials:**Architecting with Patterns-Architecting Your Application's Navigation, Encouraging Action,, Appealing with Style-Styling with Support, Themes and Styles, Colors, Layout, Embracing Material Design-Understanding Material, The Default Material Theme, Designing Compatible Applications -Maximizing Application Compatibility, Designing User Interfaces for Compatibility, Providing Alternative Application Resources, Targeting Tablets and TVs, Extending Application to Watches and Cars.<br>TB1: Ch10, ch11,ch12,ch13 | 7 |

| | | |
|---|---|---|
| 4 | **Application Development Essentials:** Using Android Preferences- Working with Application Preferences, Finding Preferences Data on the File System, Creating Manageable User Preferences, Auto Backup for Android Applications.<br>Accessing Files and Directories: Working with Application Data on a Device, Practicing Good File Management, Understanding Android File Permissions, Working with Files and Directories,<br>Saving with SQLite : Working with Databases<br>Leveraging Content Providers - Exploring Android's Content Providers, Modifying Content Providers Data, Using Third-Party Content Providers<br>TB1: Ch14,Ch15,Ch16, Ch17 | 9 |
| 5 | **Application Delivery Essentials:**<br>Testing Your Applications - Best Practices in Testing Mobile Applications, Android Application Testing Essentials, More Android Automated Testing Programs and APIs, Distributing Your Applications - Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing to Google Play, Google Play Staged Rollouts, Publishing to the Google Play Private Channel, Translating Your Application, Publishing Using Other Alternatives, Self-Publishing Your Application.<br>TB1: Ch21 and Ch22 | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completing the course the students are able to:
**CO1**: Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.
**CO2**: Design Android applications using various resources and built-in classes.
**CO3**:Apply creative skills in designing and deploying the sophisticated mobile applications.
**CO4:** Design and deploy Android applications with compelling User Interfaces and databases.
**CO5**: Develop and publish the Android Application in the global marketplace for download.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1, PO2, PO3, PO4 |
| CO2 | PO2, PO3, PO4, PO5, PO7 |
| CO3 | PO4, PO5, PO6, PO8, PO9 |
| CO4 | PO4, PO5, PO9, PO10 |
| CO5 | PO6, PO7, PO8, PO11, PO12 |

**TEXT BOOK:**

**1.** Joseph Annuzzi, Jr., Lauren Darcey, and Shane Conder - Introduction to Android Application Development - Android Essentials, Fifth Edition, Pearson education, 2016.

**REFERENCE BOOKS:**

1 Reto Meier: Professional Android 4 Application Development , Wrox Publication,2015

**OPEN ELCETIVES-B**

| **Sub Title: DATABASE MANAGEMENT SYSTEMS** | | |
|---|---|---|
| **Sub Code:18IS651** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. To analyze the basic concepts and architecture of DBMS.
2. To understand the conceptual and relational models to design databases.
3. To Create and manipulate a relational database using SQL.
4. To understand the normalization steps in database design and removal of data anomalies

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Introduction:** Introduction; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A when not to use a DBMS. Data models, schemas and instances;Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Classification of Database Management systems.<br>**Entity-Relationship Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. | **9** |
| **2** | **Relational Model and Relational Algebra**: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra. Relational Database Design Using ER-to-Relational Mapping | **8** |
| **3** | **SQL :Schema Definition, Basic Constraints and Queries:** SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; | **8** |
| **4** | **DatabaseDesign: Functional Dependencies and Normalization:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third | **7** |

| | | |
|---|---|---|
| | Normal Forms; Boyce-Codd Normal Form. | |
| **5** | **Transaction Management: Introduction to transaction** processing,Transaction and system concepts,Desirable properties of transaction, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL.<br>**Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, | **7** |

**Note 1:Each unit will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completing the course the students are able to:
**CO1:** Analyze the database concepts and data models for real world applications.
**CO2:** Design a database schema for database application
**CO3 :** Design and apply the queries to the database to meet the user requirements.
**CO4:** Apply normalization techniques to database .
**CO5:** Analyze the concepts of transaction processing,Concurrency control

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO2,PO4,PO5 |
| CO2 | PO2,PO4,PO5,PO6 |
| CO3 | PO2,PO3, PO5, PO9 |
| CO4 | PO2,PO3,PO5 |
| CO5 | PO4, PO6, PO9 |

**TEXT BOOKS:**
1. Elmasri and Navathe: Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.

**REFERENCE BOOKS/WEBLINKS:**
1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006.
3. Raghu Ramakrishna and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.
4. www.w3resources.com

| Sub Title: WEB TECHNOLOGIES | | |
|---|---|---|
| **Sub Code:18IS652** | **No. of Credits:3=3: 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. To create a web page using XHTML
2. To understand Cascading Style Sheets
3. To do data validation and user interaction using JavaScript

| Unit No.. | Syllabus Content | No of Hours |
|---|---|---|
| **1** | **Fundamentals of web, XHTML – 1:** Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox.<br>XHTML-1 : Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure;Basic text markup.<br>**XHTML – 2:** Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML. | **8** |
| **2** | **CSS:** Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images | **9** |
| **3** | **Javascript:**Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions | **8** |
| **4** | **Javascript and HTML documents:**The Javascript execution environment; The Document Object Model; Element access in Javascript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model | **7** |
| **5** | **Dynamic documents with javascript:** Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements | **7** |

**Note 1:All Units will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of the above course students will be able to

**CO1:** Identify and relate the different terms associated with web technologies.
**CO2:** Design simple web pages using different tags of XHTML.
**CO3**: Classify and use different levels of style sheets.
**CO4:** Validate and provide user functionality using JavaScript (client side data ).
**CO5:** Access the different elements using JavaScript and make use pattern matching concepts

| COs | Mapping with POs |
|---|---|
| CO1 | PO2,PO3,PO5 |
| CO2 | PO1,PO2,PO3,PO6,PO7,PO9 |
| CO3 | PO2,PO3,PO5,PO6 |
| CO4 | PO2,PO3,PO5,PO6,PO9 |
| CO5 | PO2,PO3,PO5,PO6 |

**TEXT BOOK:**
Robert W. Sebesta: Programming the World Wide Web, 6th Edition, Pearson education, 2010

**REFERENCE BOOKS / WEBLINKS:**

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 5th Edition, Pearson education, 2012.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.
3. www.w3schools.com

| Sub Title : UNIX AND SHELL PROGRAMMING | | |
|---|---|---|
| **Sub Code: 18IS653** | **No. of Credits:3= 3: 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week :3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Understand and execute the different types of unix command related to file, protection and security.
2. Develop shell programs using command substitution, positional parameters and control structures .
3. Implementation of SED and AWK commands.
4. Develop simple programs using PERL and AWK scripts.

| Unit No. | Syllabus Content | No of Hours |
|---|---|---|
| **1** | Introduction. The UNIX operating system, UNIX architecture, Features of UNIX, Command usage:- locating commands, internal and external commands, Man Browsing the manual pages ,Understanding the man documentation<br>File system: - the file, what is in a file name?, The parent child relationship ,The HOME variable: the Home directory, Pwd: checking your current directory,Cd: changing the current directory Mkdir : making directories, Rmdir: removing current directories, Absolute pathnames Relative pathnames, Ls :listing directory contents, Unix file system.<br>Basic file attributes: Ls –l: listing file attributes, the –d option: listing directory attributes,File ownership, File permission , Chmode: changing file permission (relative and absolute method), Directory permission, changing file ownership, chown, chgrp.<br>The vi editor: Vi basics, three modes of vi editor ,Input mode –entering and replacing text, Saving text and quitting –the ex mode,Navigation, Editing text,Undoing last editing instructions, Repeating the last command, Searching for a pattern substitution.<br>The shell: The shells interpretive cycle, shell offering, pattern matching. Escaping and quoting: Redirection: the three standard files,/dev/null and dev/tty: two special files,Pipe, Tee: creating a tee, Command substitution, Shell variables | **8** |
| **2** | **The process:** Process basics, Ps:process status, System process, mechanism of process creation,Internal and external commands, Process states and Zombies, Running jobs in background,Nice: job executing with low priority, Killing processes with signals, Job control , at and batch: execute later,cron:running jobs periodically,Time: timing processes<br>**Customizing the environment:** The shells, Environmental variables, the common environmental variables,aliases,in-line command editing , The initialization scripts.<br>**More file attributes:** File systems and Inodes, Hard links,Symbolic links and | **8** |

| | | |
|---|---|---|
| | ln,The directory,Umask: Default file and directory permission, Modification and access times,Find: locating files,<br>**Simple filters:** The sample database, Pr:printing files,Head: displaying the beginning of a file, Tail: displaying the end of a file,Cut: slitting a file vertically,Paste : pasting files,Sort:ordering a file, Uniq: locate repeated and non repeated lines, Tr:translating characters. | |
| **3** | **Filters using regular expression: Introduction,grep**: searching for a pattern,Basic regular expression(BRE), Extended regular expression(ERE) and egrep,**Sed:** the stream editor, Line addressing, using multiple instructions,**Context addressing**Writing selected lines to a file, Text editing,Substitution, basic regular expression<br>**Essential shell programming:** Shell script, Read: making scripts interactive, Using command line arguments, Exit and exit status of command, Logical operator && and \|\| - conditional execution<br>The if conditional, Using test and [] to evaluate expressions**,** The case conditional, Expr:computation and string handling , $ 0: calling a script by different names,While: looping, For : looping with a list , Set and shift :manipulating the positional parameter,The header document ,Trap :interrupting a program, Debugging shell script with set –x, Sample validation and entry scripts. | **8** |
| **4** | **Awk**-advanced filter: Simple awk filtering, Splitting a line into fields, Printf: formatting output,Variables and expressions, The comparison operators, Number processing,Variables, The –f option : storing awk programs in a file,The BEGIN and END section, Built in variables,Arrays, functions,Control flow – the if statement,Looping with for, Looping with while | **8** |
| **5** | **Perl-the master manipulator:** Perl preliminaries, The chop function, Variables and operators,The string handling functions, Specifying filenames in command line, $-: the default variable,Current line number ($.) and range operator (..), Lists and arrays, Foreach:looping through a list,Split:, join,dec2bin.pl,grep,associative arrays,Regular expressions and substitution,File handling, file tests, subroutines | **7** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of the above course students will be able to

**CO1:** Develop simple command level codes for file, process, redirection, piping, protection and security
**CO2:** Demonstrate the usage of shell using shell positional parameters and command substitution.
**CO3:** Demonstrate different types of SED addressing and AWK filtering.
**CO4:** Develop PERL programs for string usage, file concept and arrays handling.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1, PO2,PO3,PO4 |
| CO2 | PO1,PO2,PO3,PO4,PO5 |
| CO3 | PO1,PO2,PO3,PO4,PO5 |
| CO4 | PO1,PO2,PO3,PO4,PO5,PO7 |

**TEXT BOOK:**
UNIX –Concepts and Applications, Sumitabha Das, 4 thEdition, Tata Mc GrawHill, 2006.
(Chapters 1.2, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19)

**REFERENCE BOOKS:**
1. UNIX and Shell Programming, Behrouz A. Forouzan and Richard F. Gilberg, Thomson, 2005.
2. Unix & Shell Programming, M.G. Venkateshmurthy, Pearson Education, 2005.

| Sub Title: MACHINE LEARNING LAB | | |
|---|---|---|
| **SubCode: 18ISL66** | **No. of Credits:1=0: 0 : 1 (L-T-P)** | **No. of lecture hours/week : 2** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE + SEE = 50 + 50 =100** | |

**Course Objectives :**

This course will enable students to:

1. Define machine learning and understand about various machine learning applications
2. Differentiate supervised, unsupervised and reinforcement learning methods
3. Apply decision trees, neural networks, Bayes classifier, K-means clustering and k-nearest neighbor methods for problems in machine learning

## LIST OF PROGRAMS

## PART-A:

**Execute the following programs using Google Colab/Anaconda/Jupiter Notebook:**

1. Demonstrate the following:

a. Creation of .CSV files

b. insert synthetic data manually into .CSV files

c. uploading of .CSV files from local drive to python environment.

d. uploading of .CSV files from Google drive to python environment.

2. Demonstrate how to generate synthetic datasets(not manual entry) and generate at least 4 features.

3. Demonstrate the working of Find-S algorithm for finding the most specificities hypothesis using appropriate training samples.

4. Implement Candidate Elimination algorithm and display all the consistent hypotheses using appropriate training samples.

5. Create a .CSV file for the datasets containing the following fields( age, income, student, credit_rating, Buys_computer) where Buys_computer is the target attribute and implement ID3 algorithm for the same.

6. Demonstrate the working of XOR gate using Artificial Neural network with Backpropagation method using Tanh activation function.

7. Implement KNN algorithm to classify “iris dataset” using Kaggle or Machine learning repositories.

8. Implement K-means algorithm using suitable dataset from Kaggle repository or any other Machine Learning repositories.

## PART-B: Virtual Lab

1.Implementation of AND/OR/NOT Gate using Single Layer Perceptron. 2.Understanding the concepts of Perceptron Learning Rule.

3.Understanding the concepts of Correlation Learning Rule.

**Web link for 1,2 and 3:**

http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php

4.Neural networks simulation

**Web link for 4:**https://playground.tensorflow.org/

**Course Outcomes:**
After completion of course students will be able to:

**CO1:** Identify problems of machine learning and it's methods

**CO2:** Apply apt machine learning strategy for any given problem

**CO3:** Design systems that uses appropriate models of machine learning

**CO4:** Solve problems related to various learning techniques

| COs | Mapping with POs |
|---|---|
| **CO1** | PO1, PO2 |
| **CO2** | PO3, PO4 |
| **CO3** | PO3, PO5,PO6 |
| **CO4** | PO4, PO9, PO12 |

| Sub Title : CLOUD COMPUTING LAB | | |
|---|---|---|
| **Sub Code:18ISL67** | **No of Credits : 0:0:1(L:T:P)** | **No. of Lecture Hours/Week : 02** |
| **Exam Duration : 3 hours** | **Exam Marks :CIE +SEE = 50 + 50 =100** | |

**Course Objectives:**

1. To understand the working and usage of different cloud service models.
2. To study the basic understanding of Installation and Configuration of Cloud environment.
3. To understand the concept of Service Model and its usage in Cloud Computing.
4. To learn development of applications using IaaS, PaaS and SaaS.
5. Understand how Cloud environment works, for various deployment models.

## I. LIST OF PROGRAMS

1. Design and demonstrate the usage of Google Form, Google Access.
2. Create an application in Salesforce.com to maintain product information.
3. Create an application in Salesforce.com to demonstrate master-child relationship for generating Invoice Bill.
4. Develop a Visual Force Page to demonstrate the working of basic visual components.
5. Develop a web application project using Codeanywhere.com and collaborate with backend database.
6. Demonstrate the working of Git and Github.
7. Demonstrate Virtualization by installing Virtual box/VMware Workstation with different flavors of Operating System on Windows 10.
8. Demonstrate a file handling program on Codeanywhere.com.
9. Demonstrate a procedure to (launch virtual machine using TryStack) to execute bash program.
10. Demonstrate the working of Docker Containers to build a custom app using open source - Play With Docker (PWD).

## II. OPEN ENDED QUESTIONS

Design and implement Cloud based application (mini-project) using any of the Cloud Service Models.

**NOTE: STUDENT IS PERMITED TO SUBMIT ANY OPEN ENDED QUESTION AND HAS TO BE APPROVED BY THE STAFF IN CHARGE.**

**Course Outcomes:**

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

**CO1**: Analyze the requirements to setup: Cloud Environment using IaaS Environment

**CO2**: Develop the ability to solve real-world problems through software development on Cloud Environment.

**CO3**: Implement, compile, test and run Java/Php/Python programs comprising on PaaS to address a particular software problem.

**CO4**: Design and develop useful Cloud applications with elegant user interfaces using SaaS.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO5,PO7,PO11 |
| CO2 | PO1,PO2, PO5, PO7,PO12 |
| CO3 | PO1,PO7,PO9,PO10,PO12 |
| CO4 | PO1,PO2,PO6,PO9,PO12 |

| Sub Title : MINI PROJECT | | |
|---|---|---|
| **Sub Code:18ISM68** | **No. of Credits: 2=0 : 0 : 2 (L-T-P)** | **No. of lecture hours/week :** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE + SEE = 50 + 50 =100** | |

| Sub Title : INTERNSHIP | | |
|---|---|---|
| **Sub Code:18ISI69** | **No. of Credits: ----** | **No. of lecture hours/week** |
| **Exam Marks: CIE + SEE = 50 + 50 =100** | | |

# Detailed Scheme and Syllabus

## ACADEMIC YEAR 2022-2023

## VII - VIII (2019-2023 BATCH) (175Credits)

**Dr. Ambedkar Institute of Technology**
**Bangalore**

**Department Of**
**Information Science and Engineering**

**Vision**

- To create **D**ynamic, **R**esourceful, **A**dept and**I**nnovative **T**echnical professionals to meet global challenges.

**Mission**

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

**DEPARTMENT VISION AND MISSION**

**Vision:**

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

**Mission:**

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

**PEO1:** Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

**PEO2:** Graduates will be equipped to enhance their knowledge through core engineering and latest technological skillsto promote lifelong learning.

**PEO3:** Graduates will be able to take up social, technical and entrepreneurial challengesin inter disciplinary and multi disciplinary fields.

## PROGRAM SPECIFIC OUTCOMES(PSOS)

**PSO1**:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

**PSO2:**Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

## PROGRAMME OUTCOMES (POs)

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

# Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2022-2023

## B.E Information Science and Engineering

**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**

**VII SEMESTER**

| Sl. No | Course and Course code | | *Course Title* | Teaching Department | Teaching Hours /Week | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory **Lecture** | Tutorial | Practical/ Drawing | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | | | | | |
| 1 | MC | 18HS71/72 | CMEP / OSHA | IM/CV | 2 | -- | -- | 03 | 50 | 50 | 100 | 2 |
| 2 | PC | 18IS71 | Big Data Analytics | ISE | 4 | - | -- | 03 | 50 | 50 | 100 | 4 |
| 3 | PC | 18IS72 | Software Testing | ISE | 4 | -- | -- | 03 | 50 | 50 | 100 | 4 |
| 4 | PE | 18IS73X | Elective-3 | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 5 | PE | 18IS74X | Elective-4 | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 6 | OE | 18IS75X | Open-Elective C | ISE | 3 | -- | -- | 03 | 50 | 50 | 100 | 3 |
| 7 | PC | 18ISL76 | Big Data Analytics Lab | ISE | -- | -- | 2 | 03 | 50 | 50 | 100 | 1 |
| 8 | PC | 18ISL77 | Software Testing Lab | | -- | -- | 2 | 03 | 50 | 50 | 100 | 1 |
| 9 | Project | 18ISP78 | Project Work Phase-1 | ISE | -- | -- | 2 | 03 | 50 | 50 | 100 | 2 |
| 10 | INT | 18ISI79 | Internship | ((If not completed after VI semester examinations , it has to be carried out during the intervening vacations of VII and VIII semesters ) | | | | 03 | --- | -- | -- | -- |
| | | | **TOTAL** | | **19** | | **4** | **27** | **450** | **450** | **900** | **23** |

**Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MC: MandatoryCourse , INT: Internship.**

**Internship:** All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

<table>
<tr><th colspan="3">Electives</th></tr>
<tr><td>Course</td><td>Electives - 3</td><td rowspan="15">Open Elective -B<br>Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department.<br>Selection of an open elective is not allowed provided,<br>• The candidate has studied the same course during the previous semesters of the programme.<br>• The syllabus content of open elective is similar to that of Departmental core courses or professional electives.<br>• A similar course, under any category, is prescribed in the higher semesters of the programme.<br>Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.</td></tr>
<tr><td>18IS731</td><td>Artificial Neural Networks</td></tr>
<tr><td>18IS732</td><td>C# Programming and .Net</td></tr>
<tr><td>18IS733</td><td>Software Architecture</td></tr>
<tr><td>18IS734</td><td>BlockChain Technology</td></tr>
<tr><td>Course Code</td><td>Electives – 4</td></tr>
<tr><td>18IS741</td><td>Storage Area Network</td></tr>
<tr><td>18IS742</td><td>Ethical Hacking</td></tr>
<tr><td>18IS743</td><td>Soft and Evolutionary Computing</td></tr>
<tr><td>18IS744</td><td>Deep Learning</td></tr>
<tr><td>Course code</td><td>Open Elective -C</td></tr>
<tr><td>18IS751</td><td>Mobile Application Development</td></tr>
<tr><td>18IS752</td><td>Python Programming</td></tr>
<tr><td>18IS753</td><td>Artificial Intelligence</td></tr>
<tr><td colspan="3">CMEP: Cost Management of Engg.Projects, OSHA: Occupational Safety and Health Administration</td></tr>
</table>

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

# Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2022-2023

**B.E Information Science and Engineering**

**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**

**VIII SEMESTER**

| Sl. No | Course and Course code | | *Course Title* | Teaching Department | Teaching Hours /Week | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory Lecture | Tutorial | Practical/ Drawing | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | | | | | |
| 1 | MC | 18HS81 | CMEP / OSHA | IM/CV | 4 | -- | -- | 03 | 50 | 50 | 100 | 2 |
| 2 | Project | 18ISP81 | Project Work phase-2 | ISE | | - | 2 | 03 | 50 | 50 | 100 | 10 |
| 3 | Seminar | 18ISS82 | Technical Seminar | ISE | - | -- | 2 | 03 | 50 | -- | 50 | 1 |
| 4 | INT | 18ISI83 | Internship | ISE | (Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semester) | | | 03 | 50 | 50 | 100 | 2 |
| | | | | **TOTAL** | **04** | | **4** | **12** | 200 | **150** | **350** | **15** |

**Note: INT: Internship, MC: Mandatory Course**

## Electives

**Internship:** Those, who have not pursued /completed the internship will be declared as failed and have to complete duringsubsequent SEE examination after they satisfy the internship requirements

**CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration**

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

# VII SEMESTER

| Course Title: CMEP / OSHA | | |
|---|---|---|
| **Course code:18IS71/72** | **No. of Credits:2=2 : 0 : 0 (L-T-P)** | **No. of lecture hours/week :2** |
| **Exam Duration : 3 hours** | **Exam Marks :CIE +Assignment + Group Activity + SEE = 45 + 5 + 50 = 100** | **Total No. of Contact Hours:** |

| Sub Title: BIG DATA ANALYTICS | | |
|---|---|---|
| **Sub Title:18IS71** | **No. of Credits:4=4 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours:52** |

**Course Objectives:**

- Understand Big data for industry applications.
- Analyze business case studies for Big data analytics
- Define managing of Big data without SQL
- Develop Mapreduce analytics using Hadoop and related tools.

| UNIT No. | Syllabus Content | No. of Hours |
|---|---|---|
| 1 | **Introduction to Big Data:** Types of Digital Data: classification of Data(Structured, semi structured and unstructured), Characteristics of Data, Evolution of Big Data, Definition of Big Data, challenges of Big Data, Characteristics of Big Data (Volume, Velocity, Variety), Other characteristics of Big Data which are not Definitional Traits of Big Data, Why Big Data?, Are we Information consumer of producer? , Traditional BI vs Big Data, Typical Data warehouse environment, Typical Hadoop Environment, What is changing in realms of Big Data? **Text1:Chapter1,Chapter2** | 10 |
| 2 | **Introduction to NoSQL and Hadoop : NoSQL:** Introduction( What is it?, Where It is Used, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL,NewSQL)<br>**Hadoop:** Introduction (features, key advantages of Hadoop, Versions of Hadoop, Overview of Hadoop ecosystems, Hadoop distributions, Hadoop vs SQL, Integrated Hadoop Systems offered by leading market vendors, cloud based Hadoop solutions)**Text1:Chapter4,Chapter5** | 10 |
| 3 | **Introduction to MongoDB and MapReduce :MongoDB**: Introduction (What is MongoDB, Why MongoDb, using JSON to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document- Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language.<br>**MapReduce:** Introduction, Mapper, Reducer, Combiner, Partitioner, | 11 |

| | | |
|---|---|---|
| | Searching, Sorting, Compression. **Text1:Chapter6,Chapter8** | |
| 4 | **Introduction to HIVE AND Pig: HIVE** Introduction (What is HIVE?, HIVE Architecture, HIVE data Types, HIVE File Formats, HIVE query Language, RCFile implementation, Sharding, user-Defined Functions .<br>**Pig:** Introduction( What is Pig? The anatomy of Pig, Pig on Hadoop, Pig philosophy,Use Case for Pig- ETL Processing, Pig Latin overview, Datatypes in Pig, running Pig, Execution modes of Pig, HDFS commands, Relational operators, Eval function, complex Data Types, Piggy Bank, User-Define Functions, Parameter substitution, Diagnostic Operator, Word Count Example using Pig, When to use and not use Pig, Pig at Yahoo, Pig vs HIVE. **Text1:Chapter9,Chapter10** | 11 |
| 5 | **Overview of SPARK, Tensor Flow, Theone:** Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Spark about anatomy of job runs, Anatomy of a Spark Job, Run–Task Execution cluster managers and, Executors and Cluster Managers Python Example ,Hive and, Execution engines installing, Installing Spark MapReduce and, Transformations and Actions RDDs and, Resilient Distributed Datasets–Functions resource requests, Resource Requests shared variables, Shared Variables–Accumulators sorting data, Total Sort YARN and, Spark on YARN–YARN cluster mode. Machine Learning with MLlib.**Text2:Chapter1,Chapter2** | 10 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

Course Outcomes:
After completing the course the students are able to:
CO1: Describe Big data and use cases from selected industry domains.
CO2: Discuss about NoSQL Big data management.
CO3: Install, configure, and run Hadoop.
CO4: Perform Mapreduce analytics using Hadoop.
CO5: Use Hadoop related tools such as HBase, MongoDB, Pig ,Spark, Hive for Big Data Analytics.

| COs | Mapping with PO's |
|---|---|
| CO1 | PO2, PO8 |
| CO2 | PO4,PO5, PO8 |
| CO3 | PO3, PO4, PO5 |
| CO4 | PO4, PO5 |
| CO5 | PO3, PO4, PO5, PO11. |

Text Book(s):

1. Seema Acharya, Subhashini Chellappan, " Big Data and Analytics", Wiley India Pvt. Ltd.,2015
2. Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau ,"Learning Spark",O'Reilly Media,2015

Reference Books:

1. Shashank Tiwari, " Professional NoSQL", Wiley India Pvt. Ltd.,2011
2. Kyle Banker,Peter Bakkum,Shaun Verch,Douglas Garrett,Tim Hawkins,"MongoDB in Action", DreamTech Press, 2nd Edition ,2016
3. Chris Eaton,Paul Zikopoulos,Tom Deutsch,George Lapis,Dirk Deroos,"Understanding Big Data : Analytics for Enterprise Class
Hadoop and Streaming Data", Mcgraw Hill Education (India)Pvt.Ltd.,2012
4. Tom White,"Hadoop: The Definitive Guide",O'Reilly Media,4th Edition,2015
5. Vignesh Prajapati,"Big Data Analytics With R and Hadoop", Packt Pub Ltd ,2013
6. Dt Editorial Services,"Big Data - Black Book", Dreamtech Press,2016

Web Resources:

a) http://www.bigdatauniversity.com
b)http://www.mongodb.com
c) http://hadoop.apache.org/

| Sub Title : SOFTWARE TESTING | | |
|---|---|---|
| **Sub Code:18IS72** | **No. of Credits:4=4: 0 : 0 (L-T-P)** | **No.of Lecture Hours/Week : 4** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours :52** |

**Course Objectives:**

1. Discuss about terminologies of software testing .
2. Differentiate the various testing techniques.
3. Analyze the problem and derive suitable test cases.
4. Apply suitable technique for designing of flow graph.
5. Explain the need for planning and monitoring a process.

| Unit No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | Basics of Software Testing: Basic definitions, Software Quality , Requirements, Behaviour and Correctness, Correctness versus Reliability, Testing and Debugging, Test cases, Insights from a Venn diagram, Identifying test cases, Test-generation Strategies, Test Metrics, Error and fault taxonomies , Levels of testing, Testing and Verification, Static Testing. Problem Statements: Generalized pseudocode, the triangle problem, the NextDate function, the commission problem, the SATM (Simple Automatic Teller Machine) problem, the currency converter, Saturn windshield wiper<br>T1:Chapter1, Chapter2. T3:Chapter1. | 10 |
| 2 | Functional Testing: Boundary value analysis, Robustness testing, Worst-case testing,Robust Worst testing for triangle problem, Nextdate problem and commission problem, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations, Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Fault Based Testing: Overview, Assumptions in fault based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis.<br>T1: Chapter 5,Chapter 6,Chapter7, T2: Chapter 16 | 10 |

| | | |
|---|---|---|
| 3 | Structural Testing: Overview, Statement testing, Programme testing, Condition testing , Path testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations, Data –Flow testing: Definition-Use testing, Slice-based testing, Guidelines and observations. Test Execution: Overview of test execution, from test case specification to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles,Capture and replay<br>T1:Chapter 9,Chapter10, T2:Chapter 17, T3:Section 6.2.1, T3:Section 6.2.4 | 10 |
| 4 | Process Framework :Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback, the quality process, Planning and monitoring, Quality goals,Dependability properties ,Analysis Testing, Improving the process, Organizational factors.Planning and Monitoring the Process: Quality and process, Test and analysis strategies and plans, Risk planning, monitoring the process, Improving the process, the quality team Documenting Analysis and Test: Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports.<br>T2: Chapter 3, Chapter 4, Chapter 20, Chapter 24. | 11 |
| 5 | Integration and Component-Based Software Testing: Overview, Integration testing strategies, Testing components and assemblies. System, Acceptance and Regression Testing: Overview, System testing, Acceptance testing, Usability, Regression testing, Regression test selection techniques, Test case prioritization and selective execution. Levels of Testing, Integration Testing: Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing, A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.<br>T1 : Chapter 12,Chapter 13 T2: Chapter 21,Chapter 22 | 11 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

Course Outcomes:
After the completion of course, the students will be able to:
CO1: Derive test cases for any given problem
CO2: Compare the different testing techniques
CO3: Classify the problem into suitable testing model
CO4: Apply the appropriate technique for the design of flow graph.
CO5: Create appropriate document for the software artefact.

| COs | Mapping with Pos |
|---|---|
| CO1 | PO1,PO2,PO7,PO8,PO12 |
| CO2 | PO1,PO2,PO3,PO5,PO7 |
| CO3 | PO1,PO2,PO3,PO5 |
| CO4 | PO1,PO2,PO3,PO4,PO5 |
| CO5 | PO5,PO7,PO9,P10,PO11 |

TEXT BOOKS:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008. (Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 13)
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009. (Listed topics only from Chapters 3, 4, 16, 17, 20,21, 22,24)
3. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.( Listed topics only from Section 1.2 , 1.3, 1.4 ,1.5, 1.8,1.12,6. 2.1,6. 2.4 )

REFERENCE BOOKS/WEBLINKS:

1. Software testing Principles and Practices – Gopalaswamy Ramesh, Srinivasan Desikan, 2 nd Edition, Pearson, 2007.
2. Software Testing – Ron Patton, 2nd edition, Pearson Education, 2004.
3. The Craft of Software Testing – Brian Marrick, Pearson Education, 1995.
4. Anirban Basu, Software Quality Assurance, Testing and Metrics, PHI, 2015.
5. https://www.softwaretestingmaterial.com/software-testing/
6. https://www.guru99.com/software-testing-introduction-importance.html

| SubTitle :ARTIFICIAL NEURAL NETWORKS | | |
|---|---|---|
| **SubCode: 18IS731** | **No. ofCredits:3 =3 : 0 :0 (L-T-P)** | **No. oflectureh** |
| **ExamDuration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **TotalNo. ofContact** |

**Course Objectives:**

1. Understand the basics of ANN and comparison with Human brain
2. Provide knowledge on Generalization and function approximation and various architectures of building an ANN
3. Provide knowledge of reinforcement learning using neural networks
4. Provide knowledge of unsupervised learning using neural networks.

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | Introduction: Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks. Learning: Learning Algorithms, Error correction and Gradient Descent Rules, Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem.L1, L2 | **7** |
| **2** | Supervised Learning: Perceptron learning and Non Separable sets, α-Least Mean Square Learning, MSE Error surface, Steepest Descent Search, μ-LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm. L1, L2, L3 | **9** |
| **3** | Support Vector Machines and Radial Basis Function: Learning from Examples, Statistical Learning Theory,Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.L1, L2, L3 | **7** |
| **4** | Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.L1, L2, L3 | **7** |
| **5** | Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM, Growing Neural Gas.L1, L2, L3 | **9** |

**Note 1: All chapters will have internal choice.**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of course, the student will be able to:
**CO1:** Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
**CO2:** Understand the concepts and techniques of neural networks through the study of important neural network models.
**CO3:** Evaluate whether neural networks are appropriate to a particular application..
**CO4:** Apply neural networks to particular application.
**CO5:** Analyze the steps needed to improve performance of the selected neural network.

**Text Book**: Neural Networks A Classroom Approach– Satish Kumar, McGraw Hill Education (India) Pvt. Ltd, Second Edition.

**Reference Books**:
1. Introduction to Artificial Neural Systems-J.M. Zurada, Jaico Publications 1994.
2. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1 |
| CO2 | PO1,PO2 |
| CO3 | PO2,PO3, PO5 |
| CO4 | PO2,PO3,PO5 |
| CO5 | PO1,PO2 |

| Sub Title :C# PROGRAMMING AND .NET | | |
|---|---|---|
| **Sub Code:18IS732** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks :CIE +Assignment + Group Activity+ SEE = 45 + 5 +5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Understand the nature of .Net application development and build C# applications.
2. Familiarize with Object-oriented Programming concepts as associated with C#, Inheritance, Interfaces, Exception Handling, Reflection, Standard I/O programming, File Handling, Generics,
3. Understand Windows Application using Winforms, File I/O, XML in .NET.Web Services and Deployment.
4. Overview of .NET framework 3.0 features like WPF, WCF and WF.

| Unit No. | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **The Philosophy Of .Net:** Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries ( aka Assemblies ), the Role of the Common Intermediate Language , The Role of .NET Type Metadata, The Role of the Assembly Manifast, Compiling CIL to Platform –Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.<br>**Building C# Applications:** The Role of the Command Line Complier (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor:" Directives, An Interesting Aside: The System. Environment Class.**T1:Ch1,Ch2** | **8** |
| 2 | **C# Language Fundamentals:** The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, | **8** |

| | | |
|---|---|---|
| | Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces. **T1:Ch3** | |
| 3 | **Object- Oriented Programming With C#:** Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support, Casting Between.<br><br>**Exceptions And Object Lifetime:** Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System. System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new', The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type. T**1:Ch4,Ch5,Ch6** | **8** |
| 4 | **Interfaces And Collections:** Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).<br>**Understanding Callback Interfaces, Understanding the .NET Delegate**Type,Members of System. Multicast Delegate, The Simplest Possible DelegateExample, , Building More a Elaborate Delegate Example, UnderstandingAsynchronous **T1:Ch7,Ch8** | **8** |
| 5 | Delegates, Understanding (and Using)Events.The Advances Keywords of C#, A Catalog of C# Keywords Building aCustom Indexer, A Variation of the Cars Indexer Internal Representation ofType Indexer . Using C# Indexer from VB .NET. Overloading operators, TheInternal Representation of Overloading Operators, interacting with OverloadOperator from Overloaded- Operator- Challenged Languages, | **7** |

| | | |
|---|---|---|
| | CreatingCustom Conversion Routines, Defining Implicit Conversion Routines, TheInternal Representations of Customs Conversion Routines<br>**Understanding .Net Assembles:** Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types, Building the Multifile Assembly, Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies ( The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly. **T1:Ch9,Ch10,Ch11** | |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

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

**CO1**:Analyze the nature of .Net application development .
**CO2:**Apply OOAD concepts to build C# applications
**CO3:**Design and develop console based applications using C#
**CO4:**Develop Windows Application using Winforms, File I/O, XML in .NET.Web Services and deployment.
**CO5**:Analyze .NET framework 3.0 features like WPF, WCF and WF.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO3,PO4,PO5,PO8 |
| CO2 | PO1,PO2,PO3,PO4,PO5,PO7 |
| CO3 | PO1,PO2,PO3,PO4,PO5,PO7 |
| CO4 | PO1,PO2,PO3,PO4,PO5,PO7 |
| CO5 | PO1,PO2,PO3,PO4,PO5,PO7 |

**TEXT BOOKS:**

1. Pro C# with .NET 3.0 - Andrew Troelsen, Special Edition, Dream Tech Press, India, 2013.

2. Programming in C# - E. Balagurusamy, 5th Reprint, Tata McGraw Hill, 2011.

**REFERENCE BOOKS/WEB LINKS:**
Inside C# - Tom Archer, WP Publishers, 2011.

| Sub Title : SOFTWARE ARCHITECTURE | | |
|---|---|---|
| **Sub Code:18IS733** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week :3** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Understanding the fundamentals of software architecture.
2. Software architecture and quality requirements of a software system
3. Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
4. Methods, techniques, and tools for describing software architecture and documenting design rationale.
5. Software architecture design and evaluation processes.

| Unit No. | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Introduction:** The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.<br>Architectural Styles and Case Studies: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures.<br>T1:CH:1,CH2 | 8 |
| 2 | **Quality:** Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities.<br>**Achieving Quality:** Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.<br>T1:CH4,CH5 | 8 |
| 3 | **Architectural Patterns – 1:** Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control.<br>T1:CH2 | 8 |
| 4 | **Architectural Patterns – 2**: Adaptable Systems: Microkernel; Reflection. | 8 |

| | | |
|---|---|---|
| | Some Design Patterns: Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy.<br>T2:CH3 | |
| 5 | **Designing and Documenting Software Architecture**: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system.<br>Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views.<br>T1:CH7,CH8 | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1:**Argue the importance and role of software architecture in large scale software systems
**CO2:**Design and motivate software architecture for large scale software systems
**CO3:**Recognize major software architectural styles, design patterns, and frameworks
**CO4:**Describe a software architecture using various documentation approaches and architectural description languages
**CO5:** Evaluate the coming attractions in software architecture research and practice.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO9 |
| CO2 | PO1,PO2, PO4,PO5, PO9 |
| CO3 | PO1, PO4,PO5, PO9 |
| CO4 | PO1,PO2,PO3, PO4, PO9 |
| CO5 | PO1, PO4, PO9,PO10 |

**TEXT BOOKS**


1. Software Architecture in Practice - Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.
2. Pattern-Oriented Software Architecture A System of Patterns, Volume 1 - Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006
3. Software Architecture- Perspectives on an Emerging Discipline - Mary Shaw and David Garlan, Prentice-Hall of India, 2007.


**REFERENCE BOOKS/WEB LINKS:**


Design Patterns- Elements of Reusable Object-Oriented Software - E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995.


**Sub Title : BLOCK CHAIN TECHNOLOGY**

| Sub Code: 18IS734 | No. of Credits:3=3: 0 : 0 (L-T-P) | No.of Lecture Hours/Week: 3 |
|---|---|---|
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Understand the fundamentals of BlockChain.
2. Understand the concept of decentralization, its impact, and its relationship with blockchain technology
3. Gain knowledge of the inner workings of blockchain and the mechanisms behind bitcoin and alternative cryptocurrencies.
4. Understand the theoretical foundations of smart contracts
5. Identify and examine applications of the blockchain technology - beyond currencies

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.<br>Text Book 1: Chapter 1 | **8** |
| **2** | Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys<br>Text Book 1: Chapter 2,Chapter 4 | **8** |
| **3** | Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash<br>Text Book 1: Chapter 3, Chapter 6, Chapter 8. | **8** |
| **4** | Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.<br>Text Book 1: Chapter 10 | **8** |
| **5** | Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, 08 Media<br>Text Book 1: Chapter 17 | **7** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of the course students will be able to

**CO1**: Comprehend the fundamentals of Blockchain Technology.
**CO2:** Apply the methods of Decentralization.
**CO3:** Analyse Bitcoin and alternative coins.
**CO4:** Analyze the importance of Smart Contracts and Ethereum
**CO5:** Apply blockchain technology in various fields like Government, Health finance etc.,

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO2,PO3,PO12 |
| CO2 | PO2,PO3,PO4,PO12 |
| CO3 | PO5,PO9,PO12 |
| CO4 | PO2,PO3,PO12 |
| CO5 | PO2,PO3,PO12 |

**TEXT BOOKS:**


1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017


**REFERENCE BOOKS / WEBLINKS:**


1. Blockchain Technology (Concepts and applications), Kumar saurabh, Ashutosh saxena, Wiley, 2020.
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,2016.
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017.
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014.
5. https://www.packtpub.com/in/big-data-and-business-intelligence/mastering-blockchain-second-edition

**ELECTIVES-4**

| Sub Title : **STORAGE AREA NETWORKS** | | |
|---|---|---|
| **Sub Code: 18IS741** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. To understand the fundamentals of storage architecture along with storage virtualization.
2. To understand the metrics used for designing storage area networks.
3. To enable the students to understand RAID concepts.
4. To appreciate the use of cables technologies used in SAN technology.

| Unit No. | Syllabus Content | No. of Hours |
|---|---|---|
| 1 | **Storage System** Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.Data Center Environment: Application, Host (Compute), Connectivity, Storage.Data Protection: RAID: RAID Implementation Methods, RAID Techniques,RAID Levels, RAID Impact on Disk Performance. Intelligent Storage Systems:Components of Intelligent Storage System, Storage Provisioning.<br>**T1: Ch1: 1.2 to 1.4, Ch2: 2.1, 2.3 to 2.5, Ch3: 3.1, 3.3 to 3.5, Ch4: 4.1 and 4.2** | 8 |
| 2 | **Storage Networking Technologies** Fibre Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning,FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP,FCoE. Network Attached Storage: Components of NAS, NAS I/O Operation,NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage,Unified Storage.<br>T1 :Ch5: 5.3, 5.4, 5.6, 5.9 to 5.11, Ch6: 6.1 to 6.3, Ch7: 7.4, 7.5, 7.7 and 7.9 Ch 8: 8.1, 8.2 and 8.4 | 8 |
| 3 | **Backup, Archive and Replication** Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, BC Technology Solutions. Backup and Archive: Backup Methods, Backup Topologies, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive. Local Replication: Replication Terminology, Uses of Local Replicas, Local Replication Technologies, Local Replication in a Virtualized Environment. Remote Replication: Remote Replication Technologies, Three-Site Replication, Remote Replication and Migration in a Virtualized Environment. | 8 |

| | | |
|---|---|---|
| | T1: Ch10: 10.5, 10.8, 10.10 to 10.13, Ch11: 11.1, 11.2, 11.4 and 11.8,Ch12: 12.2, 12.3 and 12.5 | |
| 4 | **Cloud Computing and Virtualization** Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service Models, Cloud Deployment Models, Cloud Computing Infrastructure,Cloud Challenges and Cloud Adoption Considerations. Virtualization Appliances: Black Box Virtualization, In-Band Virtualization Appliances, Outof-Band Virtualization Appliances, High Availability for Virtualization Appliances, Appliances for Mass Consumption. Storage Automation and Virtualization**:** Policy-Based Storage Management, Application-Aware Storage Virtualization, Virtualization-Aware Applications.<br>T1: Ch13: 13.1 to 13.8. T2: Ch9: 9.1 to 9.5 Ch13: 13.1 to 13.3 | 8 |
| 5 | **Securing and Managing Storage Infrastructure** Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments. **Managing the Storage Infrastructure** Monitoring the Storage Infrastructure, Storage Infrastructure Management activities, Storage Infrastructure Management Challenges,Information Lifecycle management, Storage Tiering.<br>T1 : Ch14: 14.1 to 14.5, Ch15: 15.1 to 15.3, 15.5 and 15.6 | 7 |

**Note 1: All units will have internal choice**

**Note 2: Three Assignments are evaluated for 5 marks:**

**Assignment – I from Units 1 and 2.**

**Assignment – II from Units 3 and 4**

**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1**: Identify the need for storage networks and its advantages.

**CO2**: Recognize various RAID levels.

**CO3**: Apply the concept of storage virtualization and recognize steps for Business continuity planning in an Enterprise.

**CO4:** Analyze SAN architecture along with the use of cables technologies.

**CO5**: Realize the concept of management of storage network.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1, PO2, PO12 |
| CO2 | PO1, PO2 |
| CO3 | PO1,PO2,PO11 |
| CO4 | PO1,PO2,PO12 |
| CO5 | PO1, PO2,PO11, PO12 |

**TEXT BOOKS:**

1. Information Storage and Management,Author :EMC Education Services, Publisher: Wiley ISBN: 9781118094839
2. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516

**REFERENCE BOOKS/WEB LINKS:**

1.Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011.
2. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.
3. Richard Barker and Paul Massiglia: "Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs", Wiley India, 2006

| Sub Title: ETHICAL HACKING | | |
|---|---|---|
| **SubCode: 18IS742** | **No. of Credits:3 = 3: 0 : 0 (L–T– P)** | **No of Lecture Hour/week: 3** |
| **Exam Duration: 3 Hours** | **CIE + SEE = CIE+Assignment+Group Activity=40+5+5+50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

- Learn aspects of security, importance of data gathering, foot printing and system hacking.
- Learn tools and techniques to carry out a penetration testing.
- How intruders escalate privileges
- Explain Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
- Compare different types of hacking tools..

| Unit No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring. **Text Book2: Chapter1:Page 7-42:Chapter2: Page 43-77, Chapter3: Page 79-148** | **8** |
| **2.** | Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local Access, After Hacking root. **Text Book2: Chapter5:Page 224-307** | **8** |
| **3.** | Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, BruteForce Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media. **Text Book2: Chapter6:Page 315-369,Chapter7: Page 387-439** | **8** |
| **4.** | Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS **Text Book2: Chapter8:Page 445-466,Text Book1: Chapter11: Page 459-479, Chapter12: Page 483-504** | **8** |
| **5.** | Remote Control Insecurities: Discovering Remote Control Software, Connection, Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced | **7** |

| | | |
|---|---|---|
| | Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking<br>**Text Book1: Chapter13: Page 511-526, Chapter14: Page 529-563,Chapter15: Page 565,Chapter16: Page 601-651** | |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:** After the successful completion of the course the students are able to

**CO1**: Explain aspects of security, importance of data gathering, foot printing and system hacking
**CO2**: Explain aspects of security, importance of data gathering, foot printing and system hacking.
**CO3**: Demonstrate how intruders escalate privileges.
**CO4**: Demonstrate how intruders escalate privileges
**CO5**: Demonstrate how intruders escalate privileges.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1, PO2 |
| CO2 | PO1, PO2 |
| CO3 | PO1, PO2 |
| CO4 | PO1, PO4 |
| CO5 | PO1, PO2 |

**TEXTBOOKS:**

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, 2nd Edition, Tata Mc Graw Hill Publishers, 2010.
2. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 6th Edition, Tata Mc Graw Hill Publishers, 2010.
3. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall

**REFERENCE BOOKS/WEB LINKS**

1.Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 6th Edition, Tata Mc Graw Hill publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking"
3.Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

| Sub Title: SOFT AND EVOLUTIONARY COMPUTING | | |
|---|---|---|
| **Sub Code:**<br>**18IS743** | **No. of Credits:3=3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course objectives:** This course will enable students to:

- Define and understand important concepts in soft computing
- To gain insight onto Fuzzy logic
- To gain knowledge in machine learning through GA
- Analyze the various soft computing techniques

| Unit No. | Syllabus Content | No. of Hours |
|---|---|---|
| 1 | **INTRODUCTION TO SOFT COMPUTING**: ANN, FS,GA, SI, ES, Comparing among intelligent systems<br>**ANN**: introduction, biological inspiration, BNN & ANN, classification, first Generation NN, perceptron, illustrative problems<br>**Chapter1: 1.1-1.8(T1), Chapter 2: 2.1-2.6(T1)** | **8** |
| 2 | **ADALINE, MADALINE, ANN:** (2 generation), Introduction, BPN, KNN,HNN,BAM, RBF,SVM and illustrative problems<br>**Chapter 2: 3.1,3.2,3.3,3.6,3.7,3.10,3.11(T1)** | **8** |
| 3 | **FUZZY LOGIC:** Introduction, human learning ability, undecidability, probability theory, classical set and fuzzy set, fuzzy set operations, fuzzy relations, fuzzy compositions, natural language and fuzzy interpretations, structure of fuzzy inference system, illustrative problems<br>**Chapter 5(T1)** | **8** |
| 4 | **GENETIC ALGORITHMS:** Introduction to GAGA, procedures, working of GA, GA applications, applicability, evolutionary programming, working of EP, GA based Machine learning classifier system, illustrative problems<br>**Chapter 7(T1)** | **8** |

| | | |
|---|---|---|
| **5** | **Swarm Intelligent system:** Introduction, Background of SI, Ant colony system Working of ACO, Particle swarm Intelligence (PSO).<br><br>**Chapter 8: 8.1-8.4, 8.7(T1)** | **7** |

**Note 1: All Units will have internal choice.**
**Note 2: Three assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**

After completion of course students will be able to:

**CO1:** Apprehend soft computing techniques

**CO2:**Apply the learned techniques to solve realistic problems

**CO3:** Differentiate soft computing with hard computing techniques

**CO4:** Design a Fuzzy expert system and apply GA for various applications

| COs | Mapping with POs |
|---|---|
| CO1 | PO1, PO2, PO3 |
| CO2 | PO1, PO2, PO3, PO4 |
| CO3 | PO3, PO4, PO5,PO6 |
| CO4 | PO3, PO4, PO5, P12 |

**TEXT BOOKS:**

1.Soft computing : N. P Padhy and S P Simon , Oxford University Press 2015

**REFERENCE BOOKS/WEB LINKS:**

1.Principles of Soft Computing, Sivanandam, Deepa S. N Wiley India, ISBN 13: 2011

2.Vojislav Kecman, "Learning & Soft Computing Support Vector Machines, Neural Networks, and Fuzzy Logic Models", Pearson Education, New Delhi, 2007.

| **Sub Title : DEEP LEARNING** | | |
|---|---|---|
| **Sub Code:** 18IS744 | **No. of Credits:3=3: 0 : 0 (L-T-P)** | **No.of Lecture Hours/Week: 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. To understand basics of artificial neural network.
2. To gain knowledge of Deep Learning algorithms.
3. To get acquainted with a usage of TensorFlow tool.
4. To acquire the knowledge of different CNN architectures.
5. TO understand processing sequences using RNN and CNNs.

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Introduction to Artificial Neural Networks with Keras**- From Biological to Artificial Neurons, Biological Neurons, Logical Computations with Neurons, The Perceptron, MultiLayer Perceptron (MLP) and Backpropagation, Implementing MLP's with Keras, Fine Tuning Neural Network Hyper Parameters. | 8 |
| 2 | **Training Deep Neural Networks**- Vanishing/Exploding Gradients, Reusing Pretrained Layers Avoiding Overfitting Through Regularization. | 8 |
| 3 | **Custom Models and Training with TensorFlow** - A Quick Tour of TensorFlow, Using TensorFlow like NumPy, Customizing Models and Training Algorithms.<br>**Loading and Preprocessing Data with TensorFlow** – The Data API, The TF Record Format , Preprocessing the Input Features, TF Transform, The TensorFlow Datasets (TFDS) Project. | 8 |
| 4 | **Deep Computer Vision Using Convolutional Neural Networks** - Architecture of Visual Cortex, Convolutional Layer, Pooling Layer, CNN Architectures, AlexNet, GoogLeNet Using Pre-trained Models from Keras, Classification and Localization, Object Detection, Fully Convolutional Networks. | 8 |
| 5 | **Processing Sequences Using RNNs and CNNs** - Recurrent Neurons and Layers , Training RNNs, Forecasting a Time Series, Baseline Metrics , Implementing a Simple RNN , Handling Long Sequences- Tackling the Short-Term Memory Problem, LSTM Cell. | 7 |

**Note 1: All units will have internal choice**

**Note 2: Three Assignments are evaluated for 5 marks:**

**Assignment – I from Units 1 and 2.**

**Assignment – II from Units 3 and 4**

**Assignment -III from Unit 5**

**Course Outcomes:**
After the completion of the course students will be able to
**CO1**: Comprehend the fundamentals of deep learning algorithms.
**CO2:** Apply specific deep learning algorithms to obtain solutions for appropriate problems.
**CO3:** Identify and analyse deep learning techniques suitable for training the models using tensorflow and keras.
**CO4:** Conduct various experiments to demonstrate techniques using Deep neural networks, Convolutional neural networks,Recurrent neural networks so on.
**CO5:** Usage of modern tools for implementing deep learning algorithms using Python.

| **COs** | **Mapping with POs** |
|---|---|
| CO1 | PO1,PO2,PO3,PO12 |
| CO2 | PO2,PO3,PO4,PO12 |
| CO3 | PO5,PO9,PO12 |
| CO4 | PO5,PO9,PO12 |
| CO5 | PO5,PO12 |

**TEXT BOOKS:**

1. "Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems – September 2019: Second Edition" by Aurelien Geron.

**REFERENCE BOOKS / WEBLINKS:**

1. "Python Machine Learning- Third Edition" by Sebastian Raschka and Vahid Mirjalili.
2. e-Books:https://www.oreilly.com/library/view/hands-on-machine learning/9781492032632/

**OPEN ELECTIVES -B**

| **Sub Title : MOBILE APPLICATION DEVELOPMENT** | | |
|---|---|---|
| **Sub Code:18IS751** | **No. of Credits: 3 =3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks: CIE +Assignment +Group Activity=40+5+5+50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. To understand fundamentals of Android OS, and use appropriate tools for Android Application development.
2. To be familiar with managing of application resources to build elegant user interfaces with views, layouts & fragments
3. To design styling, and common design patterns found among applications
4. To understand storing of application data using preferences, files and directories, SQLite, and content providers.
5. Develop, test, debug and publish mobile applications using android Platform.

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| 1 | **Platform Overview:** Introducing Android – History of Mobile Software Development, The Open Handset Alliance, Android Platform Uniqueness, The Android Platform, Setting Up Your Android Development Environment - Configuring Your Development environment, Exploring the Android SDK. Creating first android application - Testing Your Development Environment, Building Your First Android Application.<br>**Application Basics :** Understanding Application Components - Mastering Important Android Terminology, The Application Context, Performing Application Tasks with Activities, Organizing Activity Components with Fragments, Managing Activity Transitions with Intents<br>T1: Ch1, Ch2, Ch3,ch4 | 8 |
| 2 | **Application Basics Continued** – Defining the Manifest , Managing Application Resources- What Are Resources?, Adding Simple Resource Values in Android Studio, Working with Different Types of Resources, Working with Layouts, Exploring Building Blocks, Positioning with Layouts, Partitioning with Fragments<br>T1: Ch 5,Ch 6,Ch 7, Ch 8, Ch 9 | 8 |
| 3 | **Application Design Essentials:** Architecting with Patterns-Architecting Your Application's Navigation, Encouraging Action,, Appealing with | 8 |

| | | |
|---|---|---|
| | Style-Styling with Support, Themes and Styles, Colors, Layout, Embracing Material Design-Understanding Material, The Default Material Theme, Designing Compatible Applications -Maximizing Application Compatibility, Designing User Interfaces for Compatibility, Providing Alternative Application Resources, Targeting Tablets and TVs, Extending Application to Watches and Cars.<br>T1: Ch 10, Ch11, Ch12, Ch 13 | |
| 4 | **Application Development Essentials:** Using Android Preferences-Working with Application Preferences, Finding Preferences Data on the File System, Creating Manageable User Preferences, Auto Backup for Android Applications.<br>Accessing Files and Directories: Working with Application Data on a Device, Practicing Good File Management, Understanding Android File Permissions, Working with Files and Directories,<br>Saving with SQLite : Working with Databases<br>Leveraging Content Providers - Exploring Android's Content Providers, Modifying Content Providers Data, Using Third-Party Content Providers<br>T1: Ch 14,Ch15,Ch16, Ch17 | 8 |
| 5 | **Application Delivery Essentials:**<br>Testing Your Applications - Best Practices in Testing Mobile Applications, Android Application Testing Essentials, More Android Automated Testing Programs and APIs, Distributing Your Applications - Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing to Google Play, Google Play Staged Rollouts, Publishing to the Google Play Private Channel, Translating Your Application, Publishing Using Other Alternatives, Self-Publishing Your Application.<br>T1: Ch 21 and Ch 22 | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

**Course Outcomes:**
After completing the course the students are able to:
**CO1**: Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.
**CO2**: Design Android applications using various resources and built-in classes.
**CO3**:Apply creative skills in designing and deploying the sophisticated mobile applications.
**CO4:** Design and deploy Android applications with compelling User Interfaces and databases.
**CO5**: Develop and publish the Android Application in the global marketplace for download.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1, PO2, PO3, PO4 |
| CO2 | PO2, PO3, PO4, PO5, PO7 |
| CO3 | PO4, PO5, PO6, PO8, PO9 |
| CO4 | PO4, PO5, PO9, PO10 |
| CO5 | PO6, PO7, PO8, PO11 |

**TEXT BOOK:**

1. Joseph Annuzzi, Jr., Lauren Darcey, and Shane Conder - Introduction to Android Application Development - Android Essentials, Fifth Edition, Pearson education, 2016.

**REFERENCE BOOKS:**

1 Reto Meier: Professional Android 4 Application Development , Wrox Publication,2015

| Sub Title : PYTHON PROGRAMMING | | |
|---|---|---|
| **Sub Code: 18IS752** | **No. of Credits: 3 = 3 : 0 : 0 (L-T-P)** | **No. of lecture hours/week : 3** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours : 39** |

**Course Objectives:**

1. Understanding the syntax and semantics of the Python language.
2. To create Functions in Python.
3. To handle Files & Regular expressions in Python.
4. To apply Object Oriented Programming concepts in Python.
5. To create Threaded and Networking applications in Python .

| UNIT No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | Introduction to Python, Writing Our First Python Program, Datatypes in Python, Operators in Python, Input and Output, Control Statements T1: **Ch 1, Ch 2, Ch 3, Ch 4,Ch 5 , Ch 6** | **8** |
| **2** | Arrays in Python, Strings and Characters, Functions, Lists and Tuples, Dictionaries T1: **Ch 7,Ch 8,Ch 9, Ch 10, Ch 11** | **8** |
| **3** | Introduction to OOPS, Classes and Objects, Inheritance and Polymorphism, Exceptions C**h12,Ch13,Ch14,Ch16** | **8** |
| **4** | Files in Python, Regular Expressions in Python, Data Structures in Python, Date and Time T1: C**h 17, Ch 18 ,Ch 19, Ch 20** | **8** |
| **5** | Threads, Graphical User Interface, Networking in Python, Python's Database Connectivity T1: C**h 20 ,Ch 21, Ch 22, Ch 23** | **7** |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4**
**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1**: Demonstrate the understanding and usage of core python scripting elements python constructs, data types.

**CO2** : Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.

**CO3**: Demonstrate the understanding and usage of modules, packages and regular expressions.

**CO4**: Demonstrate usage of object oriented features such as Inheritance, Polymorphism, operator overloading.

**CO5**:Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and networking applications

**Text Books:**

1. Core Python Programming: Dr.R.Nageshwara Rao,Dreadm Tech Press 2018

**Reference Books:**

1. Think Python, Allen Downey, Green Tea Press.
2. Learning Python, Mark Lutz, Orielly.

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO2,PO4 |
| CO2 | PO1,PO2,PO4 |
| CO3 | PO1,PO2,PO4,PO5,PO8 |
| CO4 | PO1,PO2,PO4,PO5,PO8 |
| CO5 | PO1,PO2,PO4,PO5,PO8 |

| **Sub Title :ARTIFICIAL INTELLIGENCE** | | |
|---|---|---|
| **Sub Code: 18IS753** | **No. of Credits:3=3: 0 : 0 (L-T-P)** | **No. of Lecture Hours/Week :3** |
| **Exam Duration : 3 hours** | **Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100** | **Total No. of Contact Hours :39** |

**Course Objectives:**

1. Understand about agent, behavior and structure
2. Learn different AI models and search strategies
3. Representation of knowledge and reasoning
4. Gain knowledge about learning strategies

| Unit No | Syllabus Content | No of Hours |
|---|---|---|
| **1** | What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems | 8 |
| **2** | Knowledge representation issues: Representations and mappings approaches to knowledge representation, Issues in knowledge representation. | 8 |
| **3** | Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. Using predicate logic: Representing simple facts in logic | 8 |
| **4** | Resolution, Natural Deduction, Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory | 8 |
| **5** | Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning | 7 |

**Note 1: All units will have internal choice**
**Note 2: Three Assignments are evaluated for 5 marks:**
**Assignment – I from Units 1 and 2.**
**Assignment – II from Units 3 and 4 .**
**Assignment -III from Unit 5**

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

**CO1**: Describe the modern view of AI as the study of agents that receive percepts and perform actions.
**CO2**: Apply AI search Models and Generic search strategies.
**CO3**: Write Logic for representing Knowledge and Reasoning of AI systems.
**CO4**: Design different learning algorithms for improving the performance of AI systems.
**CO5**: Implement projects using different AI learning techniques

| COs | Mapping with POs |
|---|---|
| CO1 | PO1,PO2,PO12 |
| CO2 | PO1,PO2,PO12 |
| CO3 | PO1,PO2,PO4,PO6,PO12 |
| CO4 | PO1,PO2,PO3,PO4,PO12 |
| CO5 | PO1,PO2,PO3,PO4,PO6,PO12 |

**TEXT BOOKS:**

**1."Artificial Intelligence: A Modern Approach "**by Stuart Russel, PeterNorvig, 2nd Edition, Pearson Education, 2003.

**2."Artificial Intelligence**" by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata MCGraw Hill 3rd edition. 2013

**REFERENCE BOOKS/WEBLINKS:**

1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

E Books:

1. Practical Artificial Intelligence Programming With Java,Third Edition ,Mark Watson
2. Artificial Intelligence Lecture Notes MIT.

MOOCs:1. Artificial Intelligence -http://www.nptelvideos.in/2012/11/artificial-intelligence.html

| Sub Title :BIG DATA AND ANALYTICS LAB | | |
|---|---|---|
| **Sub Code:18ISL76** | **No of Credits : 0:0:1(L:T:P)** | **No. of Lecture Hours/Week : 02** |
| **Exam Duration : 3hours** | **Exam Marks :CIE + SEE = 50 + 50 =100** | |

**Course Objectives:**

1. To understand the concept of Big data with hands on.
2. Understand installation of various Big data tools under Hadoop.
3. To apply Hadoop concepts to various applications and NoSQL implementation.

## I. LIST OF PROGRAMS

1.Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the hadoop fs command when interacting with HDFS.

a. Review the commands available for the Hadoop Distributed File System:
b. Copy file foo.txt from local disk to the user's directory in HDFS
c. Get a directory listing of the user's home directory in HDFS
d. Get a directory listing of the HDFS root directory
e. Display the contents of the HDFS file user/fred/bar.txt

2. Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the hadoop fs command when interacting with HDFS.

a. Move that file to the local disk, named as baz.txt
b. Create a directory called input under the user's home directory
c. Delete the directory input old and all its contents
d. Verify the copy by listing the directory contents in HDFS.

3. Demonstrate word count on an input file using MapReduce program.

4. Using movie ratings data, Develop the queries in Hive for the following-

a. List all the Users who have rated the movies (Users who have rated at least one movie)
b. List of all the User with the max, min, average ratings they have given against any movie
c. List all the Movies with the max, min, average ratings given by any user

5. In this program you will use HiveQL to filter and aggregate click data to build facts about user's movie preferences. The query results will be saved in a staging table used to populate the Oracle Database.

The moveapp_log_json table contains an activity column. Activity states are as follows:

- RATE_MOVIE
- COMPLETED_MOVIE
- PAUSE_MOVIE
- START_MOVIE
- BROWSE_MOVIE
- LIST_MOVIE
- SEARCH_MOVIE
- LOGIN
- LOGOUT
- INCOMPLETE_MOVIE.
- PURCHASE_MOVIE

a. Write a query to select only those clicks which correspond to starting, browsing, completing, or purchasing movies. Use a CASE statement to transform the RECOMMENDED column into integers where 'Y' is 1 and 'N' is 0. Also, ensure GENREID is not null. Only include the first 25 rows.

b. Write a query to select the customer ID, movie ID, recommended state and most recent rating for each movie.

6. The moveapp_log_json table contains an activity column. Activity states are as follows:

- RATE_MOVIE
- COMPLETED_MOVIE
- PAUSE_MOVIE
- START_MOVIE
- BROWSE_MOVIE
- LIST_MOVIE
- SEARCH_MOVIE
- LOGIN
- LOGOUT
- INCOMPLETE_MOVIE.

a. Load the results of the previous two queries into a staging table. First, create the staging table:

b. Next, load the results of the queries into the staging table.

7. Write R program to:

a. Create two matrices and perform multiplication & division on those matrices.

b. Create a data frame and print the: data frame, structure of data frame and summary of data frame.

c. Create a Bar chart and sketch the Bar chart by taking months as input & plot it against revenue. Also, add legend to the chart that includes regions.

## II. OPEN ENDED QUESTIONS

1. Installation and Configuration of Hadoop software on stand alone system.

2. Installation and Configuration of Hadoop software on Ubuntu cluster system.
3. Highest temperature year wise using MapReduce.

**NOTE:**

1. **STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**

2. **STUDENT IS REQUIRED TO EXECUTE ONE PROGRAM FROM PART A and ONE PROGRAM FROM PART B .**

**Course Outcomes:**
After the completion of course, the students will be able to:
CO1: Elucidate installation of various Big data tools under Haoop.
CO2: Implement HiveQL statements.
CO3: Differentiate between SQL and NoSQL commands.

| COs | Mapping with POs |
|---|---|
| CO1 | PO2,PO5,PO7,PO11 |
| CO2 | PO5, PO7,PO12 |
| CO3 | PO7,PO9,PO10,PO12 |

| **Subject :SOFTWARE TESTING LAB.** | | |
|---|---|---|
| **Sub Code:18ISL77** | **No. of Credits :0:0:1** | **No. of lecture hours/week : 02** |
| **Exam Duration : 3 hours** | **CIE + SEE = 50 + 50 =100** | |

**Course objectives:**

1. Analyse the requirements for the given problem statement
2. Design and implement various solutions for the given problem
3. Employ various design strategies for problem solving.
4. Construct control flow graphs for the solution that is implemented
5. Create appropriate document for the software artifact

## I. LIST OF PROGRAMS

1. Design and develop a program in a language of your choice to solve the triangleproblem defined as follows: Accept three integers which are supposed to be the threesides of a triangle and determine if the three values represent an equilateral triangle,isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that theupper limit for the size of any side is 10. Derive test cases for your program based onboundary-value analysis, execute the test cases and discuss the results.

2. Design, develop, code and run the program in any suitable language to solve thecommission problem. Analyze it from the perspective of boundary value testing, derivedifferent test cases, execute these test cases and discuss the test results.

3. Design, develop, code and run the program in any suitable language to implement theNextDate function. Analyze it from the perspective of boundary value testing, derivedifferent test cases, execute these test cases and discuss the test results.

4. Design and develop a program in a language of your choice to solve the triangleproblem defined as follows: Accept three integers which are supposed to be the threesides of a triangle and determine if the three values represent an equilateral triangle,isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that theupper limit for the size of any side is 10. Derive test cases for your program based onequivalence class partitioning, execute the test cases and discuss the results.

5. Design, develop, code and run the program in any suitable language to solve thecommission problem. Analyze it from the perspective of equivalence class testing,derive different test cases, execute these test cases and discuss the test results.

6. Design, develop, code and run the program in any suitable language to implement theNextDate function. Analyze it from the perspective of equivalence class value testing,derive different test cases, execute these test cases and discuss the test results.

7. Design and develop a program in a language of your choice to solve the triangleproblem defined as follows: Accept three integers which are supposed to be the threesides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene

triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.

8. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.

9. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.

10. Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.

11. Design, develop, code and run the program in any suitable language to implement the quicksort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.

12. Design, develop, code and run the program in any suitable language to implement an absolute letter grading procedure, making suitable assumptions. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results

## II.OPEN ENDED QUESTIONS

1. Study of testing tool (e.g. winrunner)
2. Study of web testing tool (e.g. selenium)
3. Study of bug tracking tool (e.g. bugzilla)
4. Study of any test management tool (e.g. test director)
5.Study of any open source testing tool (e.g. test link)

**NOTE :**

**1. Student is permitted to submit open ended solution to any other open ended question apart from the list above . but it has to be approved by the staff in charge.**
**2. In the examination each student picks one question from a lot of all 12 questions.**

| **Sub Title : PROJECT WORK PHASE -I** | | |
|---|---|---|
| **Sub Code:18 ISP78** | **No. of Credits: 2** | |
| | | |

| | | |
|---|---|---|
| **Sub Title : INTERNSHIP** | | |
| **Sub Code:18 ISI79** | **No. of Credits: 2** | |
| | | |

# VIII SEMESTER

| Sub Title :CMEP/OSHA | | |
|---|---|---|
| SubCode: 18IM81 / 18CV81 | No. of Credits: 2 | |

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