ESTD. 1939

KARNATAK LAW SOCIETY'S
GOGTE INSTITUTE OF TECHNOLOGY
"JNANA GANGA" UDYAMBAG, BELAGAVI-590008, KARNATAKA, INDIA.
Approved by AICTE & UGC
Permanently Affiliated and Autonomous Institution Under
Visvesvaraya Technological University, Belagavi
www.git.edu

ESTD. 1979

2018-19 Scheme

Department: Information Science and Engineering

Programme: B.E. (Information Science and Engineering)

5th to 6th Semester Scheme of Teaching and Examination

5th and 6th Semester Syllabus

Fifth Semester (Regular)									
S.No.	Course Code	Course		Contact Hours	Total Contact Hours/week	Total credits	Marks		
				L – T - P			CIE	SEE	Total
1.	18IS51	Computer Networks	PC	4 – 0 – 0	4	4	50	50	100
2	18IS52	Object Oriented Modeling and Design	PC	3– 0 – 0	3	3	50	50	100
3	18IS53	Internet of Things	PC	3 – 2 – 0	5	4	50	50	100
4	18IS54	Formal Language Automata Theory	PC	3-2-0	5	4	50	50	100
5	18IS55X	Professional Elective-I	PE	3 – 0 – 0	3	3	50	50	100
6	18IS56X	Open Elective – I (Only for Other branches)	OE	3 – 0 – 0	3	3	50	50	100
7		EMPLOYABILITY SKILLS –I	MNC	3 -0 – 0	3	-	50	-	50
8	18ISL57	Computer Networks Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
9	18ISL58	Software Design and Modeling Lab(Mini-Project)	LAB	0 – 0 – 3	3	1.5	25	25	50
		Total			32	24	400	350	750

Fifth Semester (Diploma)									
S.No.	Course Code	Course		Contact Hours	Total Contact Hours/week	Total credits	Marks		
				L – T - P			CIE	SEE	Total
1	18DMATIS51	Numerical Methods and Probability	BS	4 – 0 – 0	4	4	50	50	100
2.	18IS52	Object Oriented Modeling and Design	PC	3 – 0 – 0	3	3	50	50	100
3	18IS53	Internet of Things	PC	3 – 2 – 0	5	4	50	50	100
4	18IS54	Formal Language Automata Theory	PC	3 – 2 – 0	5	4	50	50	100
5	18IS55X	Professional Elective-I	PE	3 – 0 – 0	3	3	50	50	100
6	18IS56X	Open Elective – I (Other branches)	OE	3 – 0 – 0	3	3	50	50	100
7	18ISL57	Computer Networks Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
8		EMPLOYABILITY SKILLS – I	MNC	3 -0 - 0	3		50		50
9	18ISL58	Software Design and Modeling Lab (Mini-Project)	LAB	0 – 0 – 3	3	1.5	25	25	50
		Total			32	24	400	350	750

**** One Course exemption in 5th sem for Diploma lateral entry students to maintain the same credits as regular.(**Computer Networks **– exempted for Diploma students)**

	V sem				
Course Code	**Professional Elective I**	**L-T-P**	**Course Code**	**Open Elective I (Other branches)**	**L-T-P**
18IS551	Unix System Programming	3-0-0	18IS561	UNIX Shell Programming (integrated)	2-0-2
18IS552	Advanced Java (integrated)	2-0-2	18IS562	Introduction to Data Structure	3-0-0
18IS553	Probability & Statistics	3-0-0	18IS563	Computer Graphics	3-0-0

Sixth Semester									
S.No.	Course Code	Course		Contact Hours	Total Contact Hours/week	Total credits	Marks		
				L – T - P			CIE	SEE	Total
1.	18IS61	Artificial Intelligence	PC	3 – 0 – 0	3	3	50	50	100
2	18IS62	Data Science	PC	4– 0 – 0	4	4	50	50	100
3	18IS63	Distributed Computing System	PC	4 – 0 – 0	4	4	50	50	100
4	18IS64X	Professional Elective-II	PE	3 – 0 – 0	3	3	50	50	100
5	18IS65X	Professional Elective-III	PE	3 – 0 – 0	3	3	50	50	100
6	18IS66X	Open Elective – II	OE	3 – 0 – 0	3	3	50	50	100
7	18ISL67	Data Science Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
8	18ISL68	Artificial Intelligence Lab	LAB	0 – 0 – 3	3	1.5	25	25	50
9	18IS69	Constitution of India, PE and HV	HS	1 – 0 – 0	1	1	25	25	50
10		EMPLOYABILITY SKILLS – II	MNC	3-0-0	3	-	50	-	50
		Total			27	24	425	375	800

VI sem					
Course Code	**Professional Elective II**	**Course Code**	**Professional Elective III**	**Course Code**	**Open Elective II (only for other branches)**
18IS641	Data Mining (2-0-2)	18IS651	Cloud Computing (3-0-0)	18IS661	Java Programming Basics (2-0-2)
18IS642	**Big Data Management (3-0-0)**	18IS652	Network Programming(3-0-0)	18IS662	Basics of Computer Networks (3-0-0)
18IS643	**System Software(3-0-0)**	18IS653	Introduction to Sales Force (2-0-2)[industry	18IS663	Database Application Designing (2-0-2)
18IS644	Cyber Security(3-0-0)	18IS654	Compiler Design(3-0-0)	18IS664	Internet of Things (IoT) (2-0-2)

18IS645	Robotic Process Automation(3-0-0)				

V SEM

COMPUTER NETWORKS

Course Code	18IS51/CS51	**Credits**	4
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	4 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 45 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. Elucidate basic computer networking.
2. Demonstration of application layer protocols.
3. Discuss transport layer services and understand UDP and TCP protocols.
4. Explain routers, IP and Routing Algorithms in network layer.
5. Demonstrate the error detection and correction at link layer.

Pre-requisites: Fundamentals of basic mathematics, Data Structures and algorithms, Computer Organization, Operating systems.

Unit - I **9 Hours**

Introduction to Computer Networks and the Internet: What Is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models

Self Study: Networks Under Attack

Unit – II **9 Hours**

Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP Commands and Replies, Electronic Mail in the Internet, The Internet's Directory Service, Peer-to-Peer Applications-Bit Torrent File distribution protocol.

Unit - III **9 Hours**

Transport Layer: Introduction and Transport-Layer Services, Multiplexing and DeMultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer: Go-Back-N and Selective Repeat, Connection-Oriented Transport: TCP.

Self Study: Using the wireshark for exploring the TCP and UDP.

Unit – IV **9 Hours**

The Network layer: Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router? The Internet Protocol (IP): Forwarding and Addressing in the Internet.

Self Study: Routing in the Internet: BGP

Unit - V **9 Hours**

The Link Layer: Links, Access Networks, and LANs: Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Introduction to Link Virtualization and Data Center Networking.

Books

Text Books:

1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 .

Reference Books:

1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition

2. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER

E-recourses (NPTEL/SWAYAM.. Any Other)- https://nptel.ac.in/courses/106105081/

3 Andew S Tanenbaum and David Wetherall, Computer Networks, Fifth Edition Pearson

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	Explain the use of computer networking and the layering concept.	L2
2.	Explain the principles of application layer protocols.	L2
3.	Recognize transport layer services and infer UDP and TCP protocols.	L3

4.	Differentiate between the different routing algorithms in network layer.	L4
5.	Perform error detection and correction at link layer.	L3

	Program Outcome of this course (POs)	PO No.
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
3	**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.	**10**

Course delivery methods	Assessment methods
1. Lecture	1. Internal Assessment
2. PPT	2. Assignment
3. Demonstration	3. Quiz
4. Video Lectures	4. Course project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting at least one full question from each unit.

OBJECT ORIENTED MODELING AND DESIGN

Course Code	18IS52/CS52	Credits	3
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3 – 0 – 0	SEE Marks	100marks
Total Hours:	39	SEE Duration	3 Hours for 100 marks

Course Learning Objectives

1. To Bring out the importance of object oriented software development.
2. To study and understand the UML notations as applicable to different stages of software development
3. To model given real world problem using object oriented concepts and notations.

Pre-requisites: Basics of object oriented programming and Software Engineering

Unit – I 8 Hours

Introduction, Modeling Concepts, Class Modeling: Introduction to Object Orientated (OO) development. OO themes; OO modeling history Modeling as Design Technique: Modeling; abstraction; The three models.

Class Modeling: Object and class concepts; Link and associations concepts; Generalization and Inheritance; Advanced object and class concepts; Association ends; N-ary associations; Aggregation;

Abstract classes; Metadata; Reification; Constraints; Derived data; Packages;

Unit – II 8 Hours

State Modeling, Advanced State Modeling: State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Advanced State Modeling: Nested state diagrams;

Nested states; Signal generalization; Concurrency; A sample state model;

Unit – III 7 Hours

Interaction Modeling, Advanced interaction Modeling: Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special

constructs for activity models

Unit – IV 8 Hours

Domain Analysis: Overview of domain analysis; Domain class model; Domain state model; Domain

interaction model; Iterating the analysis.

Unit – V 8 Hours

Application Analysis: Application interaction model; Application class model; Application state

model; Adding operations. .

Text Books

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML,

Pearson Education, 2nd Edition and onwards.

2. Grady Booch, James Rumbaugh, Ivar Jacobson, "Unified Modeling Language User Guide",
Publisher: Addison Wesley.

Reference Books

1 Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition,
Pearson Education, 2007 and onwards.
2 Brahma Dathan, SarnathRamnath: Object-Oriented Analysis, Design, and Implementation,
Universities Press, 2009 and onwards.
3 Grady Booch, James Rumbaugh, Ivar Jacobson, "Unified Modeling Language Reference
Manual", Publisher: Addison Wesley.

E-Resources

1 https://nptel.ac.in/courses/106105153/

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Identify and explain different UML notations for a given problem statement	L2
2. Apply UML notations to model real world problems at different stages of software development.	L3
3. Perform domain and application Analysis for a given real world problems	L4

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	1
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.	2
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.	3
4. **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.	5

Course delivery methods

1. Chalk and board
2. PPT

Assessment methods

1. Internal assessment
2. Assignment

3. Video lectures

3. Quiz
4. Seminar / project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

INTERNET OF THINGS

Course Code	18IS53	Credits	4
Course type	PC	CIE Marks	50 Marks
Hours/week: L-T-P	3 – 2 – 0	SEE Marks	50 Marks
Total Hours:	40	SEE Duration	3 Hours

Course learning objectives

1. To introduce the concepts of designing the Embedded systems using the microcontroller and peripheral circuits.
2. To present the techniques of interfacing the sensors and actuators with IoT development board.
3. To develop the skills of designing and developing the IOT applications

Pre-requisites :

Microprocessors and Microcontrollers, Embedded C and Python programming.

Unit – I 8 Hours

Embedded Computing: Introduction, Complex Systems and Microprocessors, Embedded Systems Design Process.

Instruction Sets, CPUs: Preliminaries, ARM Processor, Programming Input and Output, Supervisor mode, Exceptions, Traps, Coprocessors, Memory Systems Mechanisms, CPU Performance.

Self-Study: CPU Power Consumption.

Unit – II 8 Hours

Introduction To Internet Of Things : Definition and Characteristics of IoT, physical design of IoT, IoT Protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates. Overview of Microprocessor and Microcontroller.

Self-Study: Basics of Sensors and actuators.

Unit – III 8 Hours

Prototyping IoT:

IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software, Technology & Protocols. Domain Specific IoTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Self-Study: IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software

Unit – IV **8 Hours**

IoT Architecture And Protocols: Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model. Protocols- 6LowPAN, RPL, CoAP, MQTT.

Self-Study: Device Discovery capabilities – Registering a device, De-register a device, Querying for devices, Intel IoTivity, XMPP Discovery extension.

Unit – V **8 Hours**

Cloud Services For IoT: Introduction to Cloud Storage models and communication APIs Web-Server Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API

Self-Study: Amazon Web services for IoT.

Text Book:

1. Wayne Wolf: Computers as Components, Principles of Embedded Computing Systems Design, 2nd Edition, Elsevier, 2008. (UNIT I)
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things (A Hands-on-Approach)" **,** 1st Edition, VPT, 2014. (UNIT 2,4,5)
3. Internet of Things Quick Guide - PDF https://www.tutorialspoint.com/internet_of_things/internet_of_things_quick_guide.htm (UNIT 3)

Reference Book:

1. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
2. Marco Schwartz, "Internet of Things with Arduino: Build Internet of Things Projects With the Arduino Platform**".**

Course Outcome (COs):

At the end of the course, the student should be able to:	Blooms Level
1. **Illustrate** the functionality of Microprocessors, Complex Systems, Embedded System and IoT.	**L2**
2. **Identify** the skills of interfacing sensors and actuators with IoT systems, using IoT protocols and communication models.	**L2**

3.	**Design** software programs Domain Specific IOT applications.	**L3**
4.	**Apply** Architecture Reference Models for IoT applications	**L3**
5.	**Analyze** the Cloud Storage models and Web services for IoT.	**L4**

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
3. **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.	**PO5**
4. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO9**
5. **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.	**PO10**

Course delivery methods	**Assessment methods**
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment Tests
4. NPTEL / EDUSAT	4. Course Seminar
5. Class Room Exercises	5. Course Project (Mini project)

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

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FORMAL LANGUAGE AUTOMATA THEORY

Course Code	18IS54	**Credits**	4
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	4-0-0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To study abstract computing machines, Language representation techniques, Regular Expressions, Grammar constructions and associated theories and tools to realize formal language.
2. Employ finite state machines to solve problems in computing.
3. Discuss the hierarchy of problems arising in the computer science.
4. Understand the Turing theory and its significance.

Pre-requisites : Basic knowledge of problem solving and Discrete mathematics

Unit – I **08 Hours**

Introduction to Finite Automata: Introduction to Finite Automata, Structural Representation. The central concepts of Automata theory – Alphabet, Strings & Languages. Deterministic Finite Automata (DFA), Non-Deterministic and Equivalence of NFA and DFA,

Self learning : FA with Epsilon (ε) transitions and Applications of Finite automata.

Unit – II **08 Hours**

Regular Expressions and languages: Regular Expressions, Finite Automata and Regular Expressions, Properties of Regular Languages (RL): Proving Languages not to be Regular. Equivalence and Minimization of Automata.

Self learning : Closure properties of Regular Languages and Applications of Regular Expressions

Unit – III **08 Hours**

Context-Free Grammars (CFG) and Languages (CFL): Context-Free Grammars, Parse Trees,
Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Normal forms for Context Free Grammar.
Self learning : Closure properties and Pumping lemma for Context Free Languages.

Unit – IV **10 Hours**

Pushdown Automata (PDA): Definition of Pushdown Automata, The languages of a PDA: Acceptance
by Final state & Empty stack.
Introduction to Turing Machines (TM): Turing Machine model : Definition of Turing Machine , Transition Function , Instantaneous Description & Moves , Programming a Turing Machine , Language recognition by Turing Machine.
Self learning : Deterministic Pushdown Automata, Turing Machine as a acceptors, Turing Machine as Transducers.

Unit – V **06 Hours**

LEX and YACC Tools: The Simplest Lex Program, Recognizing Words with Lex. Grammars: Parser-
lexer communication, A Yacc Parser, Rules section. Running Lex and Yacc and
examples Using Lex: Regular Expressions and examples.
Using Yacc: Shift reduce parsing, Arithmetic Expressions and Ambiguity.

Book

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory,
   Languages and Computation", Pearson Education, 3/E, 2013.
2. John R. Levine and Tony Mason and Doug Brown, Lex and Yacc, "UNIX programming tools", 2/E, 2012.
3. S . P. Euguene Xavier "Theory of Automata , Formal Languages and Computation ", 5 / E 2011.

Reference Books

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey
   D. Ullman , "Compilers *Principles, Techniques and Tools",*Pearson Education , 2 / E,2008
2. Peter Linz, "An Introduction to Formal Languages and Automata",Narosa Publishing House, 5/E,
   2011.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** the concepts & properties of automata and **Design** the optimized DFA for the given problem description.	L2, L4
2. Design the Regular Expressions for the given pattern and examine the properties of RE.	L4
3. Write the Grammar for the given language description and survey the properties of languages	L3

4. Write programs to implement lexical analyzer & parsers using software tools.		L3
5. Explain the properties of PDA and **Design** PDA for the given problem description .		L2, L4
6. Explain the properties of TM and **Design** Turing Machine for the given problem description.		L2, L4

	Program Outcome of this course (POs)	**PO No.**
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	1
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.	2
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.	3
4.	**Modern tool usage:** Create, select, apply appropriate techniques, resources,and modern engineering IT tools including prediction, modeling to complex engineering activities with an understanding of the limitations.	5

Course delivery methods(planned)	**Assessment methods(planned)**
1. Chalk and board	1. Internal assessment
2. PPT	2. Assignment
3. Video lectures	3. Quiz
	4. Seminar / project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

UNIX SYSTEM PROGRAMMING

Course Code	18IS551	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3-0-0	**SEE Marks**	50 marks
Total Hours:	40 Hrs.	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce POSIX and UNIX standards as applicable to files and processes.
2. To develop the ability to handle processes and its related functionalities.
3. To learn the concept of inter process communication.
4. To provide basic knowledge about UNIX signals handling.

Pre-requisites : Operating System, Unix Shell Programming.

Unit – I 8 Hours

POSIX Standards and File System: POSIX Standards and APIs, 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.

Unit – II 8 Hours

UNIX Files APIs: General File APIs, open, creat, read, write, lseek, chmod, close, stat, fstat, File and
Record locking, Directory file APIs, FIFO file APIs, Symbolic link APIs.

Unit – III 8 Hours

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.

Unit – IV 8 Hours

Inter-process Communication: Introduction, Pipes, popen and pclose Functions, Co-processes,
FIFOs, Message Queues, Semaphores, Shared Memory.

Unit – V 8 Hours

Signals and Daemon Processes: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and waitpid API, The sigsetjmp and siglongjmp Functions, kill, alarm, Interval Timers.
Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.

Books

Text Books:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999 and onwards.
2. W. Richard Stevens, "Advanced Programming in the UNIX Environment", Pearson Education, 2nd Edition and onwards.

Reference Books:

1. W. Richard Stevens, Bill Fenner, Andrew M. R., "UNIX® Network Programming The Sockets Networking API", Volume 1, Prentice Hall India, 2nd edition and onwards.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Describe** the POSIX/UNIX standards and File system.	**L2**
2. **Discuss** the concept of different file APIs.	**L2**
3. **Explain** the different features of UNIX processes and its related functionalities.	**L2**
4. **Design** and implement programs for inter process communication using pipes.	**L3**
5. **Implement** and demonstrate the concept of UNIX signals and daemon processes.	**L3**

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2. **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural science and engineering science	**2**
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.	**3**
4. **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.	**10**

Course delivery methods	Assessment methods
1. Chalk and board	1. Internal assessment
2. PPT	2. Assignment
3. Video lectures	3. Quiz
4.	4. Seminar / project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

ADVANCED JAVA

Course Code	18IS552/CS552	Credits	3
Course type	PE	CIE Marks	50
Hours/week: L-T-P	2-0-2	SEE Marks	50
Total Hours	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives (CLOs)

1. Understand the different ways of handling I/O in Java, including file I/O.
2. Demonstrate the multithreading concepts and develop multithreaded applications.
3. Build Java applications using Java Data Base Connectivity (JDBC) to interact with databases
4. Build server-side programs using Servlets.

Pre-requisites: Java programming concepts.

Unit – I 08 Hours

Java I/O: Byte streams and Character streams, The Byte Stream classes, The Character Stream classes, Predefined streams, Using Byte Streams, Using Java's Type Wrappers to Convert Numeric Strings.

Unit – II 08 Hours

File I/O: Reading and Writing Files using Byte Streams, Automatically closing a file, Reading and Writing Binary data, Random-Access Files, Using Java's Character-based Streams, File I/O using Character Streams,

Unit – III 08 Hours

Multithreaded Programming: Multithreading Fundamentals, The Thread class and Runnable interface, Creating a thread, Creating multiple threads, Determining when a thread ends, Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized statement, Thread communication using notify(), wait() and notifyall(), Suspending, Resuming and Stopping threads

Unit – IV 08 Hours

JDBC: 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 - commit(), rollback(), SavePoint.

Unit – V 08 Hours

Servlets: 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 Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

Text Books:

1. Herbert Schildt and Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.
2. Jim Keogh, J2EE: The Complete Reference, TMH Edition 2002 onwards.

Reference Books:

1. Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2nd Edition and onwards.
2. Y. Daniel Liang , "Introduction to JAVA Programming", Pearson's , Seventh Edition onwards.

Lab Term-works

1. Write a Java Program to demonstrate the implementation of stream classes in Java.
2. Write a Java Program to demonstrate the implementation of Java's Type Wrappers.
3. Write a Java Program to demonstrate the implementation of reading and writing binary operations in Java.
4. Write a Java Program to demonstrate the implementation of File I/O operations in Java.
5. Write a Java Program to demonstrate the implementation of Multithreading.
6. Write a Java Program to demonstrate the implementation of Synchronization in Java.
7. Write a Java Program to demonstrate the implementation of JDBC packages in Java.
8. Write a Java Program to demonstrate the implementation of Java Servlets.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Identify the different ways of handling I/O and file I/O in Java	L2
2. Write Java programs to demonstrate multithreading concepts.	L3
3. Apply Java Data Base Connectivity (JDBC) concepts to write applications that interact with databases	L3
4. Demonstrate server-side programs using Servlets	L3

Program Outcome of this course (POs)

	PO No.
1. **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.	3
2. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9
3. **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.	10
4. **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.	**12**

Course delivery methods

1. Lecture & Board
2. Power-point Presentation
3. Online Videos / Learning
4. Class Room Exercises

Assessment methods

1. Assignments
2. Quizzes
3. Internal Assessment Tests
4. Course Activity

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
*IA test could be two tests each of one hour duration or only one test of 2 hours duration. Submitting Journal/ Project report is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.	25 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

PROBABILITY AND STATISTICS

Course Code	18IS553	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. This course aims at providing the required skill to apply the statistical tools in engineering problems.
2. To introduce the basic concepts of probability and random variables and introduce the basic concepts of two dimensional random variables.
3. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
4. To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

Pre-requisites : Mathematics

Unit – I 8 Hours

PROBABILITY AND RANDOM VARIABLES: Probability – The axioms of probability – Conditional probability – Baye‘s theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

Unit – II 8 Hours

BASICS OF STATISTICS: What are statistics?, How do we obtain and sample data?, sampling data, Measure of statistics,Point estimates, Joint distributions – Marginal and

conditional distributions – Covariance – Correlation and linear regression, Central limit theorem

Unit – III **8 Hours**

TESTING OF HYPOTHESIS: Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

Unit – IV **8 Hours**

DESIGN OF EXPERIMENTS : One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - factorial design..

Unit – V

8 Hours

STATISTICAL QUALITY CONTROL: Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

Text Books

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund‘s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.

Reference Books

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning, New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom’s Level
1.	Exemplify the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	L2
2.	Apply the basic concepts of one and two dimensional random variables to various engineering applications.	L3
3.	Apply the basic concepts of classifications of design of experiments in different and statistical quality control.	L3
4.	Apply the concept of testing of hypothesis for small and large samples in real life problems and have the notion of sampling distributions and statistical techniques used in engineering and management problems.	L3

	Program Outcome of this course (POs)	**PO No.**
1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**

3.	**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	**2**
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.	**3**
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.	**4**

Course delivery methods	**Assessment methods**
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

UNIX SHELL PROGRAMMING

Subject Code:	18IS561	Credits:	3
Course Type:	OE	CIE Marks:	50
Hours/week: L – T – P	2-0-2	SEE Marks:	50
Total Hours:	40	SEE Duration:	3 Hours for 100 Marks

Course Learning Objectives (CLOs):

1. Understand history, origin features and architecture of UNIX Operating system.
2. Learn basic commands to interact with UNIX System and VI editor.
3. Understand UNIX file system, basic and advanced filters in UNIX
4. Learn Shell Scripting and Perl Scripting.

Prerequisites: Basic knowledge of computer concepts & programming.

Unit I

8 Hours

UNIX architecture: The operating System, The UNIX operating system, UNIX architecture, Internal and External commands, Command structure, man browsing and general purpose utilities.
The File System: The Parent-Child relationship, the HOME variable, pwd, cd, mkdir, Absolute pathnames, Relative pathnames.
vi editor: vi basics, input mode, saving text and quitting, searching for pattern(| and ?), substitution(search and replace using :s command).

Unit II

8 Hours

Basic File attributes: ls: listing directory contents, the UNIX file system, ls –l, -d option, file ownership, file permissions, chmod, directory permission, changing file ownership.
More File Attributes: File systems and inodes, hard links, symbolic link and ln, the directory, umask, modification and access times, find command.
The Process: Process basics, ps: process stutus, system processes (-e or –a), mechanism of process creation, Process states and zombies, running job in background, nice: job execution, job control, at and batch, corn, time.

Unit III

8 Hours

Simple Filters:pr, head, tail, cut, paste, sort, uniq, tr., Filters using Regular Expressions-grep and sed: grep, basic regular expressions(BRE), Extended Regular Expressions(ERE) and egrep,sed: the stream editor, line addressing using multiple instructions(-E and –F) context addressing, writing seleted lines to file(w), text editing, substitution(s), basic regular expression additional topics.

Unit IV

8 Hours

The Shell: The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables.

Unit V

8 Hours

Essential shell programming: Shell scripts, command line arguments, exit and exit status of command, the logical operators && and ||, the if condition, using test and { } to evaluate expression. The case conditional expression, expr, $0, while, for, debugging shell scripts with ser –x.

Text Books:

1. Sumitabha Das: "UNIX – Concepts and Applications", Tata McGraw Hill, 4th Edition.

Reference Books:

1. Behrouz A. Forouzan and Richard F. Gilberg: "UNIX and Shell Programming", Cengage Learning, 2005.
2. M.G. Venkateshmurthy: "UNIX & Shell Programming", Pearson Education, 2005.

Online Courses:

1. https://www.udemy.com/course/linux-shell-programming-for-beginners/
2. https://intellipaat.com/unix-shell-scripting/ NPTEL course:

1. LINUX programming & Scripting, URL: https://nptel.ac.in/courses/117/106/117106113/

Sl. No.	**Course Outcomes (COs)**	Bloom's Level
1.	Describe the architecture and features of the UNIX operating system and distinguish it from other operating systems	L1,L2
2.	Demonstrate UNIX commands for file handling and process control	L3
3.	Construct regular expressions for pattern matching and apply them to various filters for a specific task	L3
4.	Analyze a given problem and apply requisite facets of shell programming in order to devise a shell script to solve the problem	L4

Sl. No.	**Program Outcomes (POs)**	PO No.
1.	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	PO1
2.	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.	PO3

3.	Modern tool usage: Create, select, apply appropriate techniques, resources, and modern engineering IT tools including prediction, modeling to complex engineering activities with an understanding of the limitations.	PO5

Program List:

1. Develop a Shell program to check and display 10 leap years.
2. Develop a Shell program to check the given string is palindrome or not.
3. Develop a Shell program to find the roots of a quadratic equation.
4. Develop a Shell program to check the given integer is Armstrong number or not.
5. Develop a Shell program to generate prime numbers between 1 and 50.
6. Develop a Shell program to find the sum of square of individual digits of a number.
7. Develop a Shell program to execute various UNIX commands using case statements set of numbers.
8. Develop a Shell program to count the number of vowels in a line of text.
9. Develop a Shell program to display student grades.
10. Develop a Shell program to find the smallest digit from a number.
11. Develop a Shell program to find the sum of two numbers using function programming.
12. Develop a Shell program to generate Fibonacci series.

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
*IA test could be two tests each of one hour duration or only one test of 2 hours duration. Submitting Journal/ Project report is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.	25 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

INTRODUCTION TO DATA STRUCTURES

Subject Code:	18IS562	Credits:	3
Course Type:	OE	CIE Marks:	40
Hours/week: L – T – P	3-0-0	SEE Marks:	40
Total Hours:	40	SEE Duration:	3 Hours for 100 Marks

Course Learning Objectives:

1. To introduce elementary data structures.
2. To give emphasis on selection of right data structure for given problem scenario.
3. To provide an insight to linear and nonlinear data structures and their applications.

Pre requisites:

1. Programming Knowledge using C/C++.

UNIT I

8 Hours

Introduction to Data Structures:
Introduction to data structures, Characteristics of data structures, types of data structures.
Arrays:
Introduction, Types of arrays, Representation of 1-D array in memory, Array Traversal, Insertion and deletion, Sorting and Searching, 2-D arrays, Matrix Operations.

UNIT II

8 Hours

Linked Lists:
Introduction, Linked list-Basic Concept, Implementation, Types of linked lists, Circular linked list Doubly linked list.

UNIT III

8 Hours

Linear Data Structures-Stacks:
Introduction, Stack representation in Memory, Stack Operations, Stack Implementation.

UNIT IV

8 Hours

Linear Data Structures-Queues:
Introduction, Queues-Basic concept, Logical representation of Queues, Queue Operations, Queue Implementation, Circular Queues.

UNIT V

8 Hours

Non Linear Data Structures: Trees
Introduction, Basic concept, Binary Tree, Binary Tree Representation, Binary Tree Traversal, Binary Search tree, Expression Trees.

Text Books

1. E. Balguruswamy,Data Structures, McGraw Hill Education(india) Private Limited.

2. Langsam, Augenstein and Tenenbaum—Data Structures using C and C++, Second edition, Prentice Hall India

Online Courses

NPTEL Course URL: https://nptel.ac.in/courses/106/102/106102064/
edX Course URL: https://www.edx.org/course/introduction-to-data-structures

Sl. No.	Course Outcomes (COs)	Bloom's Level
1.	Define and discuss basics oflinear and nonlinear data structures.	**L2**
2.	Demonstrate advantages and disadvantages of specific data structures.	**L2**
3.	Select appropriate data structures for providing solution to real world problem.	**L3**
4.	Develop understanding of linear and non-liner data structures.	**L2**
5.	Apply linear and non-liner data structures for solving complex problems.	**L3**

Sl. No.	Program Outcomes (POs)	PO No.
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
3.	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes thatmeet the specified needs with appropriate consideration for the public healthand safety, and the cultural, societal, and environmental considerations.	**PO3**
4.	**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.	**PO10**

Course delivery methods	Assessment methods
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demonstrations / Animations	3. IA Test
4. Audio and Videos	4. Course Project/Seminar

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

COMPUTER GRAPHICS

Course Code	18IS563	**Credits**	3
Course type	OE	**CIE Marks**	50 marks
Hours/week: L-T-P	3-0-0	**SEE Marks**	50 marks
Total Hours:	40 Hrs;	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To present the computer graphics fundamentals and all aspects of computer picture formation.
2. To introduce the OpenGL package.
3. To understand the concept of transformations and animations.
4. To familiarize the techniques of visualization for both 2D and 3D objects.

Pre-requisites: C Programming, Linear Algebra and Geometry.

Unit - I 8 Hours

Introduction: A graphics system, Images: Physical and synthetic, The synthetic camera model, The programmer's interface, Graphics architectures, The Sierpinski gasket, Programming 2D Applications, The OpenGL API, Primitives and attributes.

Unit - II 8 Hours

Introduction: Color, Viewing, Control functions, The Gasket program, Polygons and recursion, The three-dimensional gasket**.**
Input and Interaction: Interaction, Input devices, Programming Event Driven Input, Menus, A simple CAD program, Building Interactive Models, Animating Interactive Program, Design of Interactive Programs, Logic Operations.

Unit - III **8 Hours**

Geometric Objects and Transformations : Three-dimensional Primitives, Coordinate Systems and Frames, Frames in Open GL, Modeling a Colored Cube, Affine Transformations, Rotation, Translation and Scaling, Transformation in Homogeneous Coordinates, Concatenation of Transformations, 3D Transformations.
Case study : Paint 3D windows tool.

Unit - IV **8 Hours**

Viewing: Classical and computer viewing, Viewing with a Computer; Positioning of the camera, Simple projections, Projections in OpenGL, Hidden-surface removal.
Lighting: Light and Matter, Light Sources, The Phong Lighting model, Computation of vectors.

Unit - V **8 Hours**

Shading: Polygonal Shading, Approximation of a sphere by recursive subdivisions, Light sources in OpenGL, Specification of materials in OpenGL, Shading of the sphere model, Global Illumination.

Book

Text Books:

1. Edward Angel: Interactive Computer Graphics A Top-Down Approach with OpenGL, 5th Edition & above, Pearson Education, 2008

Reference Books:

1. Donald Hearn and Pauline Baker: Computer Graphics- OpenGL Version, 3rd Edition, Pearson Education, 2004.
2. F.S. Hill Jr.: Computer Graphics Using OpenGL, 3rdEdition, PHI, 2009.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** the computer graphics system and all aspects computer image generation.	L2
2. **Apply** OpenGL API to design and develop simple 2D & 3D applications.	L3
3. **Illustrate** the concepts of viewing, lighting and shading with respect to computer graphics.	L2

Program Outcome of this course (POs)	**PO No.**

1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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	**2**
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.	**3**

Course delivery methods	Assessment methods
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Audio and Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Addition of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

EMPLOYABILITY SKILLS - I

Course Code		**Credits**	MNC
Course type	MNC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	-
Total Hours:	Lecture = 30 Hrs; Tutorial = 00Hrs Total = 30 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. The course is designed to develop the employability skills of a student.

Unit – I **6 Hours**

Quantitative Aptitude: Number System (3 Hours)
Soft Skills: Body Language (1.5), Grooming and Etiquette (1.5)

Unit – II **6 Hours**

Quantitative Aptitude: Ratio, Proportion & Partnership (1.5), Average(1.5)
Logical Reasoning: Number Series (1)
Verbal Ability: Comprehension (2)

Unit – III 6 Hours

Quantitative Aptitude: Percentages (2)
Logical Reasoning: Blood Relations (1), Letter Series (1)
Verbal Ability: Sentence Correction (2)

Unit – IV **6 Hours**

Quantitative Aptitude: Profit and Loss (2)
Logical Reasoning: Seating Arrangement (1), Data Arrangement (1)
Verbal Ability: Ordering of Sentences (2)

Unit – V **6 Hours**

Quantitative Aptitude: Time & Work (2)
Logical Reasoning: Analogy (1), Direction Sense Test (1.5)
Soft Skills: Group Discussions (1.5)

Books

Text Books:

1. How to prepare for Quantitative Aptitude for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 4th Edition, 2018.

2. How to prepare for Logical Reasoning for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.
3. How to prepare for Verbal Ability and Reading Comprehension for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.
4. How to prepare for Data Interpretation for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 5th Edition, 2018.

Course Outcome (COs)

At the end of the course, the student will be able to	**Bloom's Level**
1. Clear the Aptitude round of recruiters during placements	
2. Perform confidently during the GD and Interview process	
3. Develop behaviors that are appropriate for a professional	

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	1
2. **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.	3
3. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9

Course delivery methods		**Assessment methods**	
1.	Black Board Teaching	1.	Internal Assessment
2.	Power Point Presentation	2.	Assignment
3.	Class Room Exercise	3.	Quiz

Scheme of Continuous Internal Evaluation (CIE):

Components	Average of best two IA tests out of three	Average of two Online Tests	Class Participation	Total Marks
Maximum Marks: 50	25	15	10	50
➢ **Writing two IA tests is compulsory.** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Self Study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 (out of 100)**

3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

COMPUTER NETWORKS LABORATORY

Course Code	18ISL57	**Credits**	1.5
Course type	LAB	**CIE Marks**	25 marks
Hours/week: L-T-P	0-0-3	**SEE Marks**	25 marks
Total Hours:	36	**SEE Duration**	3 Hours/2 Hours for 50 marks

Course learning objectives

1. To practice the students for network programming in UNIX based operating systems
2. To design and simulate the network in latest simulation tools
3. To illustrate message controlling mechanisms
4. To Perform the real time network traffic analysis using network monitoring tools

Pre-requisites : Computer Network, Network Programming and Unix System Programming

1. Implementing client server communication using socket programming that uses connection oriented protocol at transport layer.
2. Implementing client server communication using socket programming that uses connection-less protocol at transport layer.
3. Implement the distance vector routing algorithm
4. Implement the Error detection technique using CRC-16.
5. Implement the RSA algorithm for encryption and decryption of a text file.
6 Implement Leaky bucket algorithm for congestion control
7 Using WIRESHARK observe the data transferred in client server communication using UDP and identify the UDP datagram.
8. Using WIRESHARK analyze three way handshaking connection establishment, data transfer and connection termination in client server communication using TCP.
9. Simulate a Full duplex connection in a wired network using NS3.
10. Simulate a simple Wireless network using NS3.

Books

1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff: “UNIX Network Programming”. Volume 1,
Third Edition, Pearson 2004.
2. Barry Nance: “Network Programming in C”, PHI 2002 3.Bob Quinn, Dave Shute: “Windows Socket

Network Programming", Pearson 2003.

3. Richard Stevens: "UNIX Network Programming". Volume 2, Second Edition.
4. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Develop Inter Process Communication and client server communication using Sockets.	L3
2. Implement message controlling mechanisms like error detection and encryption.	L3
3. Design and Analyze network traffic using network simulation and monitoring tools	L4

Program Outcome of this course (POs)	PO No.
1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	**2**
3. 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.	**12**

Assessment methods

1. Lab IA
2. Lab journal evaluation
3. Day today Lab Conduction from students

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

SOFTWARE DESIGN AND MODELLING LAB

Course Code	18ISL58	**Credits**	1.5
Course type	LAB	**CIE Marks**	25 marks
Hours/week: L-T-P	0 – 0 – 3	**SEE Marks**	25 marks
Total Hours:	30	**SEE Duration**	3 Hours for 50 marks

Course learning objectives

1. To Understand and Implement various phases of SDLC
2. To Apply concepts learnt in Databases, Software Engineering and programming subjects
3. To create new software based on user requirements
4. To impart state-of-the-art knowledge on Software Engineering and UML in an interactive manner through the Web
5. Present case studies to demonstrate the practical applications of different
6. concepts Provide opportunities to the students where they can solve small, real life problems

Pre-requisites : Databases Management Systems, Software Engineering, Web Programming

Part A
List of experiments

For a given application,

1. Identifying the Requirements from Problem Statements
   Requirements | Characteristics of Requirements | Categorization of Requirements | Functional Requirements | Identifying Functional Requirements
2. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios
   Use case diagrams | Actor | Use Case | Subject | Graphical Representation | Association between Actors and Use Cases | Use Case Relationships | Include Relationship | Extend Relationship |
   Generalization Relationship | Identifying Actors | Identifying Use cases | Guidelines for drawing Use Case diagrams
3. E-R Modeling from the Problem Statements
   Entity Relationship Model | Entity Set and Relationship Set | Attributes of Entity | Keys | Weak Entity | Entity Generalization and Specialization | Mapping Cardinalities | ER Diagram |
   Graphical Notations for ER Diagram | Importance of ER modeling
4. Identifying Domain Classes from the Problem Statements
   Domain Class | Traditional Techniques for Identification of Classes | Grammatical Approach
   Using Nouns | Advantages | Disadvantages | Using Generalization | Using Subclasses | Steps to Identify Domain Classes from Problem Statement | Advanced Concepts
5. Statechart and Activity Modeling
   Statechart Diagrams | Building Blocks of a Statechart Diagram | State | Transition | Action | Guidelines for drawing Statechart Diagrams | Activity Diagrams | Components of an Activity Diagram | Activity | Flow | Decision | Merge | Fork | Join | Note | Partition | A Simple Example | Guidelines for drawing an Activity Diagram

6 Modeling UML Class Diagrams and Sequence diagrams
Structural and Behavioral aspects | Class diagram | Elements in class diagram | Class | Relationships | Sequence diagram | Elements in sequence diagram | Object | Life-line bar | Messages

7 Modeling Data Flow Diagrams
Data Flow Diagram | Graphical notations for Data Flow Diagram | Explanation of Symbols used in DFD | Context diagram and leveling DFD

8 Designing Test Suites
Software Testing | Standards for Software Test Documentation | Testing Frameworks | Need for Software Testing | Test Cases and Test Suite | Types of Software Testing | Unit Testing | Integration Testing | System Testing | Example | Some Remarks

Part B

The students will design and implement their proposed project on the lines of part A.

Books

1. Joel Murach and Ray Harris, PHP and MySQL, Shroff/Murachs, 2nd Edition, 2014
2. Zak Ruvalcaba and Anne Boehm, HTML5 and CCS3, Shroff/Murachs, 3rd Edition, 2015
3. Mary Delamater, JavaScript, Shroff/Murachs, 2nd Edition, 2015

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Create** requirement document for application problems in the standard format.	L3
2. **Analyze** and translate a requirements specification into a design.	L4
3. **Construct** the software from the design, using appropriate software engineering Methodology	L5
4 **Utilize** modern engineering tools for specification, design, implementation and Testing	L3

Program Outcome of this course (POs)	PO No.
1. **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**
2. **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations	**6**
3. **Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.	**12**

Assessment methods

1. Periodic journal evaluation
2. Execution of lab experiments

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Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

VI SEM

ARTTIFICIAL INTELLIGENCE

Course Code	18IS61	Credits	3
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-0-0	SEE Marks	50 marks
Total Hours:	44	SEE Duration	3 Hours for 100 marks

Course Learning Objectives:

1. To study the fundamentals of Artificial intelligence and agent technology
2. To understand searching strategy and optimizations for problem solving
3. To understand various logic representations to specify reasoning and planning tasks
4. To understand various methods for Knowledge Representation

Prerequisites: Design of Algorithms, Discrete Mathematical Structure

UNIT I 9 Hours

Introduction: What Is AI? ; The Foundations of Artificial Intelligence; Weak AI; Strong AI;
Intelligent Agents: Agents and Environments; Good Behavior- The Concept of Rationality: Rationality, Omniscience, learning, and autonomy;
The Nature of Environments: Specifying the task environment, Properties of task environments;
The Structure of Agents: Agent programs, Simple reflex agents, Model-based reflex agents, Goal-based agents, Utility-based agents, learning agents,
How the components of agent programs work; Agent Architectures;

UNIT II 9 Hours

Problem-Solving Agents; Example Problems: Toy problems, Real-world problems;
Infrastructure for search algorithms,;
Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search ; Greedy best-first search;
Local Search Algorithms and Optimization Problems: Optimal Decisions in Games:
The minimax algorithm, Alpha-Beta Pruning: Move ordering

UNIT III 8 Hours

Knowledge-Based Agents; The Wumpus World; Logic; Propositional Logic: A Very Simple Logic: Syntax, Semantics, A simple knowledge base, A simple inference procedure;
Syntax and Semantics of First-Order Logic; Using First-Order Logic

UNIT IV 8 Hours

Definition of Classical Planning: Example: Air cargo transport, Example: The spare tire problem, Algorithms for Planning as State-Space Search: Forward (progression) state-space search, Backward (regression) relevant-states search, Heuristics for planning;

UNIT V 10 Hours

Knowledge Representation: Ontological Engineering; Categories and Objects ; Events; Mental Events and Mental Objects; Reasoning Systems for Categories
Uncertain knowledge: Acting under Uncertainty; Basic Probability Notation; Inference Using Full Joint Distributions; Bayes' Rule and Its Use;
Representing Knowledge in an Uncertain Domain; Semantics of Bayesian Networks

Text Books:

1. Stuart Russel, Peter Norvig: Artiificial Intelligence A Modern Approach, Pearson 3rd edition 2013.

Reference Books:

1. Elaine Rich Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition 2013.
2. Ben Coppin, Artificial Intelligence Illuminated, Jones and Bartlett Publishers, 1st Edition, 2004.

At the end of the course, the student will be able to	**Bloom's Level**
1. Define and explain fundamentals of Artificial Intelligence and Agent Technology	**L2**
2. Apply AI techniques on Game Playing and Logic building	**L3**
3. Apply AI techniques for problem solving, reasoning and planning	**L3**
4. Apply Knowledge Representation for uncertain domain and knowledge	**L3**

	Program Outcome of this course (POs)	**PO No.**
1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
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.	**PO3**
4.	**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.	**PO6**
5.	**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.	**PO10**

Course delivery methods	**Assessment methods**
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment Tests
	4 Course Project (Mini project)
	5. Case Studies

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

DATA SCIENCE

Course Code	18IS62	**Credits**	4
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	4 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce the concepts of data science and big data
2. To explore different statistical methods used for analysis in data science
3. To understand and apply machine learning algorithms on to applications
4. To explore the R language for statistical data analysis

Pre-requisites : Linear algebra

Unit – I 8 Hours

Introduction: Big data overview, State of the practice in Analytics, Key role for the new big data
ecosystem, Examples of big data analytics, the five steps of data science, data science life cycle

Unit – II 8 Hours

Statistical analysis: What are statistics, how do we obtain sample data, statistics measure, Point estimates, sampling distributions, Confidence intervals, exploratory data analysis, statistical methods for evaluation

Unit – III **8 Hours**

Analytical theory and methods 1: Overview of clustering, K means, additional algorithms, Linear
regression, Logistic regression, Reasons to choose and cautions, Addition regression models.

Unit – IV **8 Hours**

Analytical theory and methods 2: Overview of time series analysis, ARIMA model, Text analysis steps, A
text analysis example, Collecting raw text, Representing text, Term frequency, determining sentiments.

Unit – V **8 Hours**

Fundamentals of R Programming: Introduction to R studio, Basics of R programming, Math Variables and Strings, Vectors and Factors, Vector Operations, Reading CSV, Excel, and Built-in Datasets, Reading Text (.txt) files in R, Writing and Saving to files in R, String Operations in R, The Date Format in R, Regular Expressions in R, Packages and libraries, External packages, CRAN, Downloading and installation of desired packages from CRAN.

Text Books

1. EMC^2 education services, "Data science and big data analytics", 2017
2. Sinan Ozdemir, "Principles of data science", 2016, Packt publishers

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Explain thr basic concepts in understanding data science model	L2
2. Explain the various statistical model used in data science	L2
3. Apply the machine learning algorithms to a given application	L3
4. Demonstrate R programming for statistical analysis in data science	L3

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2. **Conduct investigations of complete problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,synthesis of the information to provide valid conclusions.	**4**
3. **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.	**5**

4.	**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.	**10**

Course delivery methods	**Assessment methods**
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

DISTRIBUTED COMPUTING SYSTEM

Course Code	18IS63	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	4-0-0	SEE Marks	50 marks
Total Hours:	45 Hrs	SEE Duration	3 Hours for 100 marks

Course learning objectives

1. To learn Basic Concepts of Distributed Systems.
2. To understand File Sharing, Distributed File System implementation.
3. To understand the concepts of Cryptanalysis, Access control.
4. To learn Basic concepts of Cloud Computing.

Pre-requisites: Basic Computer Concepts, Operating Systems.

Unit – I **09 Hours**

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Challenges: Heterogeneity, Openness, Security, Scalability, Failure Handling.
System Model: Architectural Models, Fundamental models.

Self learning topics: Security Models

Unit – II **09 Hours**

Inter Process Communication: Introduction, API for Internet Protocols, External Data Representation and Marshalling, Client – Server Communication.

Distributed Object and RMI: Introduction, Communication between Distributed Objects, RPC, Events and Notifications.

Unit – III **09 Hours**

Distributed File System: Introduction, File Service architecture.

Security in distributed systems: Introduction, Overview of security techniques: Cryptography, Certificates, Access control. Cryptographic Algorithm: Symmetric: Ex Substitution algorithm. , Asymmetric: RSA.

Unit – IV **09 Hours**

Time and Global States: Introduction, Clocks, events and process status, Synchronizing physical clocks, Logical time and logical clocks, Global states.

Coordination and Agreement: Introduction, Distributed mutual exclusion-The central server algorithm
,A ring-based algorithm

Unit – V **09 Hours**

Introduction to Cloud Computing: Introduction, Network Centric computing and Network Centric Content, Peer to Peer Systems, Cloud Computing :An old idea Whose Time has Come, Cloud Computing: Delivery Models and Services, Ethical Issues in Cloud Computing, Cloud Vulnerabilities, Major Challenges Faced by Cloud Computing.

Self learning topics: Case Studies: Amazon Web Studies.

Books

Text Books:

1. George Coulouris, Jean Dollimore, Tim Kindberg: Distributed Systems Concepts and Design, Pearson Education, Third edition.
2. Dan Marinescu : Cloud Computing Theory and Practice, ELSEVIER

Reference Books:

1. Kai Hwang, Geofrey C, Fox, Jack J, Dongarra: Distributed and Cloud Computing From Parallel processing to the Internet of Things.
2. Sunita Mahajan, Seema Shah: Distributing Computing, Published by Oxford University press 2010.

1 **E-resourses (NPTEL/SWAYAM.. Any Other):** https://nptel.ac.in/courses/106106168/

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Discuss the importance of distributed Systems with examples.	L2
2. Differentiate between the various client server communications technologies.	L4
3. Analyze mechanisms to manage security in Distributed systems.	L4
4 Compare the different algorithms that are used for synchronizing physical clocks.	L4
5 Explain the importance of cloud computing**.**	L2

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**

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.	**3**

Course delivery methods	Assessment methods
1. Lecture	1. Assignments
2. PPT	2. Internal Tests
3.	3. Quiz
4.	4. Course Activity

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

DATA MINING

Course Code:	18IS641	**Credits:**	3
Course Type:	PE	**CIE Marks:**	50
Hours/week: L – T – P	2 – 0 – 2	**SEE Marks:**	50
Total Hours:	40	**SEE Duration:**	3 Hours for 100 Marks

Sl. No.	Course Learning Objectives (CLOs)
1.	To understand data warehouse concepts, architecture, business analysis and tools.
2.	To understand data pre-processing and data visualization techniques.
3.	To study algorithms for finding hidden and interesting patterns in data.
4.	To understand and apply various classification and clustering techniques using tools.

Prerequisites

1 Statistics
2 DBMS

Unit I **08 Hours**

Data Mining:
Introduction, Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications.

Unit II **08 Hours**

Association Analysis: Basic Concepts and Algorithms: Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm, Evaluation of Association Patterns.

Unit III **08 Hours**

Association Analysis: Advanced Concepts: Handling Categorical Attributes, Handling Continuous attributes,Handling Concept hierarchy, Sequential patterns, subgraph patterns, infrequent patterns.

Unit IV **08 Hours**

Classification:
Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers.`+.104”

Unit V **08 Hours**

Clustering Techniques:
Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis.

Modern Tool usage: WEKA tool for realizing various processes involved in Data Mining.

List of Experiments:

1. Build Data Warehouse and Explore WEKA
2. Perform data preprocessing tasks and Demonstrate performing association rule mining on given data sets.
3. Demonstrate performing classification on given data sets.
4. Demonstrate performing clustering on given data sets
5. Demonstrate performing Regression on given data sets

Text Books

1. Pang-NingTan,MichaelSteinbach,VipinKumar:IntroductiontoDataMining,Pearson Education,2005.MauroPezze,MichalYoung:SoftwareTestingandAnalysis–Process, Principles and Techniques, Wiley India, 2008.
2. Jiawei Han and MichelineKamber, ―Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

Reference Books

1. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi,2009.
2. JiaweiHanandMichelineKamber:DataMining-ConceptsandTechniques,2ndEdition, Morgan Kaufmann Publisher,2006.
3. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP Computing, McGrawHill Publisher,1997.

Online Courses

1. **NPTEL Course URL**: https://nptel.ac.in/courses/106/105/106105174/
2. **edX Course URL:** https://www.edx.org/learn/data-mining
3. **Courser Course URL:**https://www.coursera.org/specializations/data-mining

Sl. No.	**Course Outcomes (COs)**	Bloom's Level
1.	Exemplify, terminologies related to Data Warehousing and Data Mining.	**L2**
2.	Apply suitable pre-processing and visualization techniques for data analysis.	**L3**
3.	Apply frequent pattern and association rule mining techniques for data analysis. And able to apply appropriate classification and clustering techniques for data analysis.	**L3**
4.	Evaluate the techniques of clustering, classification, finding, feature selection and visualization for the real world data using modern tools.	**L5**

5.	Design algorithms to solve related problems in the domain of data mining.	**L3**

Sl. No.	**Program Outcomes (POs)**	**PO No.**
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
3.	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes thatmeet the specified needs with appropriate consideration for the public healthand safety, and the cultural, societal, and environmental considerations.	**PO3**
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.	**PO4**
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.	**PO5**
6.	**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.	**PO10**

Course delivery methods	**Assessment methods**
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demonstrations / Animations	3. IA Test
4. Audio and Videos	4. Course Project/Seminar

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
*IA test could be two tests each of one hour duration or only one test of 2 hours duration. Submitting Journal/ Project report is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.	25 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

NETWORK PROGRAMMING

Course Code	18IS642	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3-0-0	**SEE Marks**	50 marks
Total Hours:	40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To understand the various network protocols.
2. Demonstrate programming with TCP and UDP.
3. To understand the concept of Unicast, Multicast and Broadcast technologies and networking applications.

Pre-requisites : Unix system Programming and Computer Network

Unit – I **8 Hours**

Introduction to Network Programming: OSI model, UDP, TCP, STCP, TCP connection establishment
and termination: Three-way handshake, TCP options, TCP connection termination, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

Unit – II **8 Hours**

Basic Concepts, Protocols and Terminology: Clients, Servers and Peers, Ports and Sockets, The Internet and IP Addresses, Internet Services, URLs and DNS.
Network Programming in Java: The InetAddress Class, Using Sockets: TCP Sockets, UDP Sockets.

Unit – III **8 Hours**

UDP: The UDP Protocol, UDP Clients, UDP Servers, The DatagramPacket Class, The DatagramSocket
Class, Socket Options, Applications using UDP.

Unit – IV **8 Hours**

Broadcasting: Introduction, Broadcast Addresses, Unicast vs Broadcast, dg_cli Function using Broadcasting, Race Conditions.

Multicasting: Introduction, Multicast Addresses, Multicast vs Broadcast on a LAN, Multicast on a WAN, Source-Specific Multicast, Multicast Socket Options

Unit – V **8 Hours**

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

Books

Text Books:

1. Java Network Programming, 4th Edition by Elliotte Rusty Harold Released October 2013 Publisher(s): O'Reilly Media, Inc.ISBN: 9781449365936
2. Introduction to Network Programming with Java, 3rd Edition by Jan Graba, Publisher: Springer

Reference Books:

1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff: "UNIX Network Programming". Volume
   1, Third Edition, Pearson 2004 and onwards.
2. Computer Networking: A Top-Down Approach, J. F. Kurose and K. W. Ross, 6th Edition,
   2013, Addison-Wesley Publishing, ISBN: 978-0132856201

Course Outcome (COs)

Outcomes usually follow the format: "At the end of the course, students will be able to '*insert action verb here + insert knowledge, skills, or attitudes the student is expected to develop']* (Highlight the
action verb representing the Bloom's level.)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** the concept of layered task and the use of different protocols.	**L2**
2. **Develop** networking applications that communicate with each other using TCP and UDP	**L3**
3. **Compare** Unicast, Multicast and Broadcast technologies and its application.	**L4**

4. **Discuss** the various application of remote login. **L2**

	Program Outcome of this course (POs)	PO No.
1.	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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	**2**
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.	**3**
4.	**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.	**10**

Course delivery methods	Assessment methods
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Audio and Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

SYSTEM SOFTWARE

Course Code	18IS643/CS643	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3-0-0	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To distinguish different software into different categories.
2. To introduce the basic functions of various system software.
3. To provide an insight into the design strategy for one-pass and multi-pass assembler.

Pre-requisites : Computer Organization.

Unit – I **8 Hours**

Introduction to System Software

Introduction to System Software, System software Vs application software,Different system softwares- Assembler, Linker, Loader, Macro processor,Text editor, debugger, device driver, compiler , interpreter, OS(basic concepts), Machine architecture of SIC/XE, Addressing modes,Instruction set,Machine level representation of programs.

Unit – II **8 Hours**

Assemblers

Basic Assembler Functions-A simple SIC Assembler, Machine Dependent Assembler Features, Machine Independent Assembler Features-Literals, Program blocks, Control sections and programming linking ,assembler design options: Two-pass, one-pass and multi-pass assembler design

Unit – III **8 Hours**

Loaders and Linkers

Basic Loader Functions-Design of an Absolute Loader, A simple Bootstrap Loader, Machine-Dependent and independent Loader Features-Relocation, Program Linking, Algorithm and Data structures for a Linking Loader. Dynamic Linkage.

Unit – IV **8 Hours**

Editors and Debugging Systems

Text Editors-Overview of Editing Process, Editor structure, User Interface, Interactive Debugging
Systems-Debugging Functions and Capabilities.Debugging Methods –By induction, Deduction and backtracking

Unit – V **8 Hours**

Macro Processor

Basic Macro Processor , Functions-Macro, Definitions and Expansion,Macro processor Algorithm and Data structures, Machine Independent Macro processor features-Concatenation of Macro parameters, Generation of Unique Labels, Conditional Macro expansion, keyword Macro Parameters.

Books

Text Books:

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd edition onwards, Pearson, 1997.
2. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers- "Principles, Techniques and Tools", 2/E, Addison-Wesley, 2007.

Reference Books:

1. D.M.Dhamdhere, "System Programming and Operating Systems", 2nd revised edition, Tata McGraw - Hill, 2009 reprint.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** the basic concepts about different system software.	**L2**
2. **Design** and implementation of assembler.	**L3**
3. **Define** the role of linkers and loaders as well as their interactions with hardware.	**L2**
4. **Discuss** the working nature of Editors, Debugging Systems and macro processors.	**L2**

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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	**2**

Course delivery methods	Assessment methods
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Audio and Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

CYBER SECURITY

Subject Code:	18IS644	**Credits:**	3
Course Type:	PE	**CIE Marks:**	50
Hours/week: L – T – P	3 – 0 – 0	**SEE Marks:**	50
Total Hours:	40	**SEE Duration:**	3 Hours

Course learning objectives

1. To understand key issues plaguing the information security world
2. To understand Social Engineering techniques
3. To perform vulnerability analysis to identify security loopholes in the target organization's network
4. To understand different types of attacks

Prerequisites: Networks, Information Security, Operating Systems

Unit – I — 8 Hours

Ethical Hacking: Overview of Ethics,Overview of Ethical Hacking,Methodology of Ethical Hacking,Networking

Foundations: Communications Models,Topologies,PhysicalNetworking,IP,TCP,UDP,Internet Control Message Protocol,Network Architectures,Cloud Computing,

Unit – II — 8 Hours

Security Foundations: The Triad,Risk, Policies, Standards, and Procedures, Security Technology, Being Prepared;

Footprinting and Reconnaissance: Open-Source Intelligence,Domain Name System,Passive Reconnaissance,Website Intelligence,Technology Intelligence,

Unit – III — 8 Hours

Scanning Networks: Ping Sweeps,Port Scanning, Vulnerability Scanning

Enumeration: Service Enumeration, Remote Procedure Calls,Server Message Block, Web-Based Enumeration

Unit – IV — 8 Hours

System Hacking: Searching for Exploits,System Compromise,Gathering Passwords, Password Cracking,Client-Side Vulnerabilities,Post Exploitation

Malware: Malware Types,Malware Analysis,Antivirus Solutions, Spoofing Attacks

Unit – V — 8 Hours

Social Engineering: Social Engineering,Physical Social Engineering,Phishing Attacks, Website Attacks

Cryptography: Basic Encryption,Symmetric Key Cryptography, Asymmetric Key Cryptography,

Books

Text Book

1. Ric Messier, CEH v10 Certified Ethical Hacker Study Guide, Sybex, 2019
2. Michael Gregg, Omar Santos, Certified Ethical Hacker (CEH) Version 10 Cert Guide, Pearson IT Certification, 3rd Edition, 2019

Reference Books

1. Matt Walker, CEH Certified Ethical Hacker All-in-One Exam Guide, Fourth Edition, McGraw-Hill, 4th Edition, 2019

Course Outcome (COs)

At the end of the course, the student will be able to		**Bloom's Level**
1.	Perform vulnerability **analysis** to **identify** security loopholes in the target organization's network, communication infrastructure, and end systems.	L4
2.	**Understand** mobile platform attack vector, android vulnerabilities, mobile security guidelines, and tools.	L2

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
3 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**8**

Course delivery methods

1. Chalk and talk
2. Power Point Presentations
3. Demos
4. Audio and Videos

Assessment methods

1. Quiz
2. Assignment
3. IA Test

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

ROBOTIC PROCESS AUTOMATION
(Industry Supported Elective)

Subject Code:	18IS645/ CS645		Credits:	03
Course Type:	PE		CIE Marks:	50
Hours/week: L – T – P	3-0-0		SEE Marks:	50
Total Hours:	50		SEE Duration:	3 Hours

Course Learning Objectives:

- To understand Basic Programming concepts and the underlying logic/structure
- To Describe RPA , where it can be applied and how its implemented
- To Describe the different types of variables, Control Flow and data manipulation techniques
- To Understand Image, Text and Data Tables Automation
- To Describe automation to Email and various types of Exceptions and strategies to handle

UNIT I **08 Hours**

PROGRAMMING BASICS & RECAP

Programming Concepts Basics - Understanding the application - Basic Web Concepts - Protocols - Email Clients -. Data Structures - Data Tables - Algorithms - Software Processes - Software Design - Scripting - .Net Framework - .Net Fundamentals - XML - Control structures and functions - XML - HTML - CSS - Variables & Arguments.

UNIT II **08 Hours**

RPA CONCEPTS

RPA Basics - History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Developemt methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Proccess Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem.

UNIT III **08 Hours**

RPA TOOL INTRODUCTION & BASICS

Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data

UNIT IV **08 Hours**

ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES

Recording and Advanced UI Interaction - Recording Introduction - Basic and Desktop Recording - Web Recording - Input/Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel - Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF.

UNIT V **08 Hours**

EMAIL AUTOMATION & EXCEPTIONAL HANDLING

Email Automation - Email Automation - Incoming Email automation - Sending Email automation - Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.

TEXT BOOK:

Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing

1 Release Date: March 2018ISBN: 9781788470940

REFERENCES:

1 Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Livingston (Author), Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation.

2 Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant

3 SrikanthMerianda,Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation

4 https://www.uipath.com/rpa/robotic-process-automation

Course delivery methods	Assessment methods
1. Lecture and Board	1. Internal Assessments
2. Power point presentations	2. Assignments
3. Videos	3. Quiz/ Seminar/ Course Project
4. Classroom Exercises	4.

Course Outcome (Cos):

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

1. Design Neural Network to solve problems in a variety of engineering domains[L6].
2. Design systems that employ fuzzy control approach[L6].
3. Device systems that employ genetic algorithm and demonstrate their working[L3].

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
3 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**8**

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA	Addition of two assignments	Seminar/ Mini Project	Total Marks	Final marks
Theory	30+30	10+10	20	100 **(reduced to 50)**	50
➢ Writing two IA test is compulsory. ➢ **Minimum marks required to qualify for SEE : 20 out of 50**					

Self Study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

CLOUD COMPUTING

Course Code	18IS651	**Credits**	03
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To understand various basic concepts related to cloud computing technologies.
2. To learn how to use Cloud Services and provide solutions for business process management.
3. To understand the concepts related to virtualization technology.
4. To get acquainted with various cloud management services and offerings.

Pre-requisites: Distributed Computing.

Unit – I **8 Hours**

Introduction: Business and IT perspective, Cloud and virtualization, Cloud services requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption.
Cloud Deployment models: Cloud characteristics, Measured Service, Cloud deployment models, security in a public cloud, public verses private clouds, cloud infrastructure self-service.

Unit – II **8 Hours**

Cloud as a service: Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service defined.
Cloud solutions: Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

Unit – III **8 Hours**

Cloud virtualization technology: Virtualization defined, virtualization benefits, server virtualization,
virtualization for x86 architecture, Hypervisor management software, Logical partitioning, VIO server, Virtual infrastructure requirements. Storage virtualization, storage area networks, network attached storage, cloud server virtualization.

Unit – IV **8 Hours**

Cloud Management: Resiliency, Provisioning, Asset management, cloud governance, high availability
and disaster recovery, charging models, usage reporting, billing and metering.

Unit – V **8 Hours**

Cloud Infrastructure: Deep Drive: Introduction, Storage Virtualization, Storage Area Network, Network
Attached Storage, Cloud Server Virtualization, Networking Essential to Cloud

Text Books

1. Cloud Computing by Dr. Kumar Saurabh, Wiley India, 2011 .

Reference Book

1. Cloud Computing Principles and Paradigms by RajkumarBuyya, Wiley India 2011 and onwards.

Course Outcome (COs)

At the end of the course, the student will be able to	**Bloom's Level**
1. **Discuss** cloud computing and control considerations within cloud computing environments.	**L2**
2. **Identify** various cloud services.	**L2**
3. **Explain** various concepts related to virtualization.	**L2**
4. **Apply** specific cloud management strategy and offerings for given scenario.	**L3**
5. **Demonstrate** working of cloud simulator.	**L3**

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
3 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**8**

Course delivery methods

1. Chalk and board
2. PPT
3. Video lectures

Assessment methods

1. Internal assessment
2. Assignment
3. Quiz
4. Seminar / project

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

BIG DATA MANAGEMENT

Course Code	18IS652	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To understand Big data dimensions, its applications and analyze business case studies in Big Data Analytics
2. To explore Hadoop framework and architecture
3. To understand basics of NoSQL
4. To understand the importance of MapReduce framework
5. To explore Big Data Tools and Technologies : Pig and Hive

Pre-requisites :
Database Management System, Unix Shell Programming

Unit – I 8 Hours

Introduction: Big Data Definition, History of Data Management-Evolution of Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics, Careers in Big Data, Future of Big Data, Use of Big Data in Social Networking, Use of Big Data in Preventing Fraudulent Activities; Use of Big Data in Retail Industry

Unit – II 8 Hours

Hadoop Ecosystem: Understanding Hadoop Ecosystem, Hadoop Distributed File System:HDFS Architecture,Concept of Blocks in HDFS Architecture, NameNodes and Data Nodes, The Command-Line Interface, Using HDFS Files, Hadoop-Specific File System Types, HDFS Commands, The org.apache.hadoop.io package, HDFS High availability:Features of HDFS.

Unit – III 8 Hours

NoSQL: Introduction to NoSQL: Why NoSQL, Characteristics of NoSQL, History of NoSQL, Types of NoSQL Data Models: Key-Value Data Model, Column-Oriented Data Model, Document Data Model, Graph Databases, Schemaless Databases, Materialized views, Distribution Models: CAP Theorem, Sharding.

Unit – IV 8 Hours

Understanding MapReduce**:** The MapReduce Framework: Exploring the Features of MapReduce,Working of MapReduce, Exploring Map and Reduce Functions, Uses of MapReduce.
YARN Architecture: Background; Advantages of YARN;YARN Architecture

Unit – V **8 Hours**

Hive: Introducing Hive, Getting started with Hive, Hive Services, Data types in Hive, Built-in Functions in Hive

Analyzing Data with Pig: Introduction to Pig: The Pig Architecture, Benefits of Pig, Properties of Pig

Text Book:

1. DT Editorial Services, "Big Data:Black Book ,Comprehensive Problem Solver", Dreamtech Press. 2016 Edition [Chapters - 1,2,4,5,11,12,13,15]

Reference Book:

1. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, Understanding Big Data – Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilly, 2012.

Course Outcome (COs)

At the end of the course, the student will be able to	**Bloom's Level**
1. **Outline** the importance of Big Data, its characteristics and use of Big Data in Retail Industry	**L1**
2. **Explain** the ecosystem of Hadoop Distributed File System(HDFS)	**L3**
3. **Apply** basics of NoSQL in Big Data	**L2**
4. **Apply** map reduce framework in analyzing the data and relate to YARN	**L2, L3**
5. **Demonstrate** tools in analyzing the data and managing Big Data	**L2**

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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.	**2**
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.	**3**
4 **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.	**10**

Course delivery methods	Assessment methods
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment Tests
	4. Case Studies

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

INTRODUCTION TO SALESFORCE
(Industry Supported Elective)

Course Code	**18IS653/ CS653**	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	2-0-2	**SEE Marks**	50 marks
Total Hours	40	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce fundamentals of Salesforce and its components used for multiple domains.
2. To gain an understanding of the Salesforce terminologies and the different operations involved in constructing an informative system
3. To develop ability to access or populate tables as an object in Salesforce database to create new processes based on the demands by users.
4. To provide a solution to real world problems with the help of lightning tools and extensions using reusable components.

Pre-requisites: Software Industry and common sales parameters, Web Programming, basics of object-oriented Programming techniques

Unit – I **8 Hours**

Introduction: Getting Around the App, Salesforce Platform Basics: Get started with salesforce platform. Discover Use Cases for the Platform, Understand the Salesforce Architecture, Navigate Setup, Power Up with AppExchange, Data Model: Understand Custom & Standard Objects, Create Object Relationships, Work with Schema Builder, Lightning Experience: Get Your Bearings, Navigate Around, Work with List Views, Work with Your Data, Company-Wide Org Settings: Learn About Regional Settings, Discover Multiple Currency Settings

Unit – II **8 Hours**

Getting Your Organization Ready for Users: Lightning Experience Productivity: Elevate Your Daily Productivity, Work with Notes and Files, Manage Your Tasks, Events, and Email, Find Your Stuff with Search, Collaborate with Feeds and Groups, Analyze Your Data with Reports and Dashboards, Configuring Search Settings: Choose the Right Search Solution, Optimize Search Results, Setting Up Chatter (Classic): Get Started with Chatter, Enable Feed Tracking, Create Publisher Actions, Approve Records from the Feed, Develop a Rollout Strategy, Support a New Business Unit: Manage User Access, Manage Chatter, Modify Your Data Model, Configure an Email Letterhead and Template, Automate Your Business Process, Mobile Access with Salesforce1.

Unit – III **8 Hours**

Elementary SCTP Sockets: Interface Models, shutdown function, Notifications.
Setting Up and Managing Users: Managing Users and Introduction to Data Security, Activity Management: Activities: Tasks, Events, and Calendars Documentation.
Security and Data Access: Data Security, Who Sees What.
Object Customizations: Creating Picklist and Picklist Administration, Creating Formula Fields and Validation Rule, Working with Page Layouts, Working with Record Types, Introduction to Business Process, Maintaining Data Quality.
Managing Data: Import Wizards, Export Wizards, Use Data Loader To Export Data, Data Loader To Import.

Unit – IV **8 Hours**

Lightning Experience Customization: Customize the Lightning Experience user interface without writing any code, Reports and Dashboards: Introduction to Reports and Dashboards, Creating New Reports with the Report Builder, Running and Modifying Reports, Format Reports with Summary, Tabular, Matrix and Joined, Building Dashboards, Email Templates and Letterheads: Email Templates and LetterHeads, Automation: Difference Between Workflow Rules and Process Builder, Process Builder, Lead Automation.

Unit – V **8 Hours**

Managing the Support Process: Managing and Resolving Cases, Customizing a Support Process, Automating Support, Understanding the Salesforce Console for Service, Collaborating in the Service Cloud, Analyzing Support Data, Lightning App Builder: Build custom pages for Lightning Experience and the Salesforce mobile app quickly with point-and-click tools.

Books

Text Book

1. Salesforce CRM - The Definitive Admin Handbook,4th Edition, Paul Goodey, Copyright © 2016 Packt Publishing

Reference Books

1. Basics of salesforce- Salesforce Docs @salesforcedocs 19 Dec 2019
2. Best Practices for Implementing Salesforce CRM- SalesforceDocs @ salesforcedocs Dec 2019
3. Salesforce Solutions Help & Training by Bruce F. Magwn © 2012 Integration Technologies, Inc.

Course Outcome (COs)

At the end of the course, the student will be able to		Bloom's Level
1.	**Understand** the Salesforce terminologies to make use for products of different commodity	L1
2.	**Describe** the uses of Salesforce in the business world as a good promotional means for marketing the products.	L2
3.	**Apply** the techniques to retrieve the customer needs by means of Salesforce designs and options	L3
4.	**Categorize** and **build** the solutions with suitable mode of representation for the domain requirements using the lightning trends.	L3, L4

	Program Outcome of this course (POs)	PO No.
1.	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	1
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.	2
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.	3
4.	**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.	6
5.	**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.	10

Course delivery methods	Assessment methods
1. Lecture	1. Assignments
2. PPT	2. Internal Tests
3. Workshop-1– Salesforce (3 days)	3. Quiz
4. Workshop-2-Lightning (2 days)	4. Course Activity

Scheme of Continuous Internal Evaluation (CIE):
The Total marks of CIE shall be 50 (Two tests of 30 marks (15 Marks Descriptive + 15 Marks Objective) each, Course project of 20 marks). The weight-age of CIE is as shown in the table below.

Component	2 IA-Tests (30 marks each) Average of two IA	Course Project (Assignment)	Total Marks
Maximum marks	30	20	50

1. **Writing two IA tests is compulsory.**
2. **Minimum qualifying marks for CIE: 20 marks.**

Scheme of Semester End Examination (SEE):	
1.	Industry Project Evaluation for 100 Marks. Examination of 100 marks for 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	Minimum marks required in SEE to pass:40 marks
3.	Industry project marks calculated by taking an average of both internal and industry side guides assessments.

CIE	SEE	TOTAL
50 Marks (30 IA Avg + 20 Course Project)	50 Marks (Industry assigned Project evaluation for 100 Marks which will be reduced to 50 Marks)	100 MARKS

COMPLIER DESIGN

Course Code	18IS654	**Credits**	3
Course type	PE	**CIE Marks**	50 marks
Hours/week: L-T-P	3-0-0	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To familiarize the structure of a compiler and activities of different phases of compilation process.
2. To provide an insight into the design strategy for front end of a compiler.
3. To learn to implement code generator.

Pre-requisites : Basic knowledge of programming and Finite Automata and Formal Languages**.**

Unit - I **8 Hours**

Introduction and Lexical Analysis

Overview of the Translation Process, A Simple Compiler, Difference between interpreter, assembler and compiler. Types of Compiler, The Phases of a Compiler.

Lexical Analysis: The Role of Lexical Analyzer, Input Buffering, Specifications of tokens,Recognition of Tokens.

Self learning: Applications of compiler technology.

Unit - II **8 Hours**

Syntax Analysis-1 :

Introduction, Context free Grammar, Writing Grammar, ambiguity, associativity, precedence, Un ambiguous Grammars,Top-down Parsing.

Unit - III **8 Hours**

Syntax Analysis-2 :

Bottom-up Parsing, Simple LR, More Powerful LR Parsers (upto constructing LALR parsing tables)

Unit - IV **8 Hours**

Syntax Directed Translation and Intermediate Code Generation:

Syntax Directed Translation: Syntax-directed Definitions, Evaluation Order for SDD, Application of Syntax-directed translation: Construction of Syntax trees(Only S-attributed SDD).

Intermediate Code Generation: Intermediate Languages, Declarations, Assignments, Boolean Expressions.

Unit – V **8 Hours**

Code Generation

Issues in the design of code generator, the target language, Basic blocks and Flow graphs, optimization
of basic blocks, a simple code generator .

Books

Text Books:

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman- Compilers-Principles, Techniques and Tools", 2/E, Addison-Wesley, 2007

Reference Books:

1. D.M.Dhamdhere, "System Programming and Operating Systems", 2nd revised edition, Tata mc-Graw Hill,2007.
2. Andrew W Apple, Modern Compiler Implementation in C, Cambridge University Press,1997
3. Kenneth C Louden , Compiler Construction Principles & Practice, Thomson Education, 1997.McGraw - Hill, 2009 reprint

E-Resources(NPTEL/SWAYAM)

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

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Analyze** and categorize the given grammar to build suitable parser.	**L4**
2. **Apply** the concept of syntax directed translation schemes to aid intermediate code generation.	**L3**
3. **Develop** intermediate code for any high level construct and generate optimized target code .	**L3**

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
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	**2**
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.	**3**

Course delivery methods	Assessment methods
1. Chalk and talk	1. Quiz
2. Power Point Presentations	2. Assignment
3. Demos	3. IA Test
4. Audio and Videos	

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

JAVA PROGRAMMING BASICS

Course Code	18IS661	**Credits**	03
Course type	OE	**CIE Marks**	50 marks
Hours/week: L-T-P	2-0-2	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs;	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To Understand the fundamentals of object-oriented programming in Java.
2. To introduce the concept of Methods and classes in Java .
3. To demonstrate the applications of inheritance in Java.
4. To Understand the concept of packages and interfaces in Java.

Pre-requisites: Basics programming concepts.

Unit – I 08 Hours

Java Programming Fundamentals: The Java Language, The Key attributes of a object oriented programming : Encapsulation, Polymorphism, Inheritance, The Java development kit, Sample program.
Introducing Data types and operators: Java's primitive data types, Literals, A closer look at variables, The scope and lifetime of variables, Operators.

Unit – II 07 Hours

Program control statements: Input characters from the keyboard, The if statement, Nested ifs, The if-else-if ladder, The switch statement, Nested switch statement, The for loop, The Enhanced for loop, The while loop, The do-while loop, Use break to exit a Loop, Use break to Form of goto, Use continue.

Unit – III 09 Hours

Introducing classes and objects: Class fundamentals, how objects are created, reference variables and assignment, Methods, Returning a Method, Returning Value, Using Parameters, Constructors, Parameterized constructors.
Methods and classes: Controlling access to class members, Pass objects as methods, How arguments are passed, Returning objects, Method overloading.

Unit – IV 07 Hours

Inheritance: Inheritance basics, member access and inheritance, constructors and inheritance, using super, multilevel hierarchy, when are constructors executed, superclass reference and subclass objects, method overriding, polymorphism, using abstract classes, using final, the Object class.

Unit – V 09 Hours

Interfaces: interface fundamentals, creating an Interface, Implementing an Interface, Using the interface references, Implementing multiple interfaces, Constants in interfaces, Extending interfaces, nested interfaces.
Packages: Package fundamentals: Defining a Package, Finding Packages and Classpath, packages and member access, importing packages, static import.

Books

Text Books:

1. Herbert Schildt& Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.

Reference Books:

1. Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2nd Edition and onwards.

Course Outcome (Cos)

	At the end of the course, the student will be able to:	Bloom's Level
1	**Explain** the concept of classes and objects.	**L2**
2	**Write** Java application programs using OOP principles and proper program structuring	**L3**
3	**Apply** the inheritance concept for making use of code reusability	**L3**
4	**Write** Java programs on Interfaces and packages	**L3**

	Program Outcome of this course (POs)	**PO No.**
1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**1**
2	**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.	**3**
3	**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.	**12**

Course delivery methods

1. Lecture & Board
2. Power-point Presentation
3. Online Videos / Learning
4. Class Room Exercises

Assessment methods

1. Assignments
2. Quizzes
3. Internal Assessment

Open Ended Programs

1. Write a program to demonstrate the implementation of 2-dimension array.
2. Write a program to demonstrate the implementation of class and its member methods.
3. Write a program to demonstrate the implementation of parameterized:
    a. Methods.
    b. Constructor.
4. Write a program to demonstrate the implementation of inheritance.
5. Write a program to demonstrate the implementation of method:
    a. Overloading.
    b. Overriding.
6. Write a program to demonstrate the implementation of interface.
7. Write a program to demonstrate the implementation of packages.
8. Write a program to demonstrate the implementation of customized exception handling.
9. Write a program to demonstrate the implementation of string handling.
10. Write a program to demonstrate the implementation of JAVA swings.

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
*IA test could be two tests each of one hour duration or only one test of 2 hours duration. Submitting Journal/ Project report is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.	25 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

BASICS OF COMPUTER NETWORKS

Subject Code:	18IS662	**Credits:**	03
Course Type:	OE	**CIE Marks:**	50 marks
Hours/week: L – T – P	3 – 0 – 0	**SEE Marks:**	50 marks
Total Hours:	40	**SEE Duration:**	3 Hours for 100 marks

Course Learning Objectives (CLOs):

1. Recognize the importance of networks.
2. Explain the relevance of internetworking.
3. Recognize the need for layered approach in the design of Networks
4. Compare and discuss the use of different types of connecting devices.
5. Explain the functions of Application layer.

Pre-requisites: Fundamentals of basic science and mathematics**.**

Unit – I

8 Hours

Introduction: Data Communications, Components, Data Flow, Networks, Physical Structures, Categories of Networks, Internet, Protocols and Standards, Addressing.

Unit - II

8 Hours

Network Models and Network Security: Layered Tasks, OSI model-Layers in OSI Model, TCP/IP Protocol Suite, Security Threats, Public Key Crypto Systems, Applications for Public Key Crypto Systems, Requirements for Public Key Cryptography, Digital Signatures.

Unit - III

8 Hours

Network Layer: TCP/IP Architecture, Address Resolution Protocol, Reverse Address Resolution Protocol, ICMP, Ipv6 header Format, UDP datagram, UDP pseudo header.

Unit - IV

8 Hours

Connecting Devices and Backbone Networks: Passive Hubs**,** Repeaters, Active Hubs, Bridges, Filtering, Two Layer switches, Three Layer switches, Gateway, Bus Backbone, Star Backbone, Connecting Remote LANs, Virtual LANs and Membership.

Unit - V

8 Hours

Application Layer, Network Tools:, Remote Logging(Telnet), File Transfer Protocol, Firewalls, Virtual Private Networks, Linux Configuration Commands such as ipconfig, ping, traceroute, netstat, dig, route, host. Introduction to Wire Shark networking tool

Text Books:

1. Behrouz Forouzon-Data Communications and Networking, McGraw Hill 4th Edition.

Reference Books:

1. Alberto Leon Garcia & Indra Widjaja - Communication Networks – Fundamental Concepts & key architectures, Tata McGraw Hill 2nd Edition.
2. William Stallings, Cryptography and Network Security, Pearson 6th edition
3. George Coulouris, Jean Dollimore, Tim Kindberg: Distributed Systems Concepts and Design, Pearson Education, Third edition

.

4. E-recourses (NPTEL/SWAYAM.. Any Other)- https://nptel.ac.in/courses/106105081/

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Differentiate between the different types of network topological models	L4
2. Explain the different functions of OSI Architectural model.	L2
3. Discuss the advantage of using layered approach and identify the role of different techniques in providing network Security.	L3
4. Differentiate between the different types of connecting devices.	L4

5.	Interpret the different functions of Application layer protocols. Apply the theoretical concepts learnt to solve different types of network problems.	L2, L3

Program Outcome of this course (POs)	PO No.
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	1
Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	2
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.	3

Course delivery methods	Assessment methods
1. Lecture delivery with discussion (black board teaching)	1. Assignments
2. Presentations	2. Quizzes
3. Online Videos/Learning	3. Internal Assessment Tests
4. NPTEL/Edusat	4. Course Seminar

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Additionof two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum Marks: 50	30+30 = 60	20	20	100
➢ **Writing two IA test is compulsory.** ➢ **100 marks will be reduced to 50** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

DATABASE APPLICATION DESIGNING

Course Code	18IS663	**Credits**	3
Course type	OE	**CIE Marks**	50 marks
Hours/week: L-T-P	2-0-2	**SEE Marks**	50 marks
Total Hours:	Lecture = 40 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To discuss and realize the importance of Database Architecture Design notations, ER Modeling,
   Mapping and Schema design.
2. To gain the knowledge Relational algebra and learn SQL , with various DB softwares/tools
3. To introduce formal database design approach through normalization and discuss various normal forms.
4. To understand the importance of Concurrent Transactions and discuss issues and transaction
   control algorithms.

Pre-requisites :

- Basic programming concepts.

Unit – I — 8 Hours

Introduction: Introduction to database, Characteristics of Database approach, Advantages of using DBMS approach, Three-schema architecture and data independence.
Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationships, Relationship types, Roles and Structural Constraints; Weak Entity Types.
CASE STUDY: ER-Modeling Hospital Management and Educational Institute.

Unit – II — 8 Hours

Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION;

Unit – III — 8 Hours

Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms;
Transaction Processing Concepts: Introduction to Transaction processing, Transaction and System concepts, Desirable properties of Transactions and issues with concurrent transactions.

Unit – IV — 8 Hours

SQL :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.

Unit – V **8 Hours**

DBMS Tools: SQL Engines, Feature of MySQL, DB2,Oracle, Introduction to PLSQL, NoSQL,

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, Addison-Wesley, 3rd edition and onwards.

Reference Books::

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, Mc-GrawHill, 3rd edition and onwards.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, Pearson education, 5th edition and onwards.

E Resources:

3. PL/SQL study material.

Course Outcome (Cos)

At the end of the course, the student will be able to	**Bloom's Level**
1. **Apply** the database concepts and design database for given application scenario	**L3**
2. **Apply** the concepts of Normalization and design database which eliminates all anomalies	**L3**
3. **Create** database and develop database programming skills in SQL and PLSQL	**L4**
4. **Explain** the issue of concurrency control in transaction processing	**L2**
5. Demonstrate various DB software/tools and explore SQL syntaxes	**L2**

Program Outcome of this course (POs)	**PO No.**
1. **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.	**PO2**
2. **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.	**PO3**
3. **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.	**PO4**
4. **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.	**PO10**
5. **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.	**PO12**

Course delivery methods

1. Lecture & Board
2. Power-point Presentation
3. Online Videos / Learning
4. NPTEL / Edusat
5. Class Room Exercises

Assessment methods

1. Assignments
2. Quizzes
3. Internal Assessment Tests
4. Course Project (Mini project)
5. Case Studies

LAB TERM WORKS:

PART – A

1. Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):
   - the NHL has many teams,
   - each team has a name, a city, a coach, a captain, and a set of players,
   - each player belongs to only one team,
   - each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
   - a team captain is also a player,
   - a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

Design a ER-Model for this application scenario using all the standard notations of ER-Model. Apply the ER-to-Relational Rules and normalization to get the relational schema and do the following :

a. Create the database with all necessary constraints(Primary and Foreign keys)
b. Populate each table with appropriate data
c. Execute queries on the tables created.(open ended)
d. Create graphical user interfaces (GUI) using HTML/PHP/VB.Net/Java

2. Design an ER-Model for an educational institute which is required to record the students attendance and IA performance in all the subjects and inform the same to their parents. The institute will have many department, each with its own faculty and Head of the department. The subjects the students study can be either elective or core. A faculty has to take atleast one subject and atmost 2 subjects and the subjects are not shared. The students take 3 tests and the average is computed by taking average of best two of

the three scores. The model be designed to record only the CIE marks and not SEE marks. After the ER-Model, map it to relational schema by indentifying Primary and Foreign keys. Normalize and do the following.

a. Create the database with all necessary constraints(Primary and Foreign keys)
b. Populate each table with appropriate data
c. Execute queries on the tables created.(open ended)
d. Create graphical user interfaces (GUI) using HTML/PHP/VB.Net/Java

3. Consider the schema for airline flight information Database:

FLIGHTS (*no: integer, fromPlace: string, toPlace: string, distance: integer, Departs: date,*

***arrives: date, price: real*)**
AIRCRAFT (*aid: integer, aname: string, cruisingrange: integer*)

CERTIFIED (*eid: integer,aid: integer*)

EMPLOYEES (*eid: integer, ename: string, salary: integer*)

Create tables and populate with appropriate values(Atleast 5 records in each table) for the given database.

Write SQL queries to

1. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.

2. For each pilot who is certified for more than three aircrafts, find the eid, ename and the maximum cruising range of the aircraft for which she or he is certified.

3. Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.
4. Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi

4. Consider the following schema for Order Database:

**SALESMAN (*Salesman_id, Name, City, Commission*) CUSTOMER (*Customer_id, Cust_Name, City, Grade, Salesman_id*) ORDERS (*Ord_No, Purchase_Amt, Ord_Date, Customer_id,Saleman_id)*

Create tables and populate with appropriate values(Atleast 5 records in each table) for the given database.

Write SQL queries to

1. Count the customers with grades above Bangalore‘s average.

2. Find the name and numbers of all salesmen who had more than one customer.

3. List all salesmen names and customer names for whom order amount is more than 4000. (Use UNION operation.)

4. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

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*)

Create tables and populate with appropriate values(Atleast 5 records in each table) for the given database.

Write SQL queries to

1. List the titles of all movies directed by “Sanjay Leela Bansali”.

2. Find the movie names where one or more actors acted in two or more movies.

3. 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.

4. Update rating of all movies directed by "Ram GopalVerma" to 5.

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
*IA test could be two tests each of one hour duration or only one test of 2 hours duration. Submitting Journal/ Project report is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project.	25 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

INTERNET OF THINGS - A PRACTICAL APPROACH

Course Code	18IS664	Credits	3
Course type	PC	CIE Marks	50 Marks
Hours/week: L-T-P	2-0-2	SEE Marks	50 Marks
Total Hours:	35	SEE Duration	3 Hours

Course learning objectives

1. To introduce the concepts of designing the Embedded systems using the microcontroller and peripheral circuits.
2. To present the techniques of interfacing the sensors and actuators with IoT development board.
3. To develop the skills of designing and developing the IOT applications

Pre-requisites :

Microprocessors and Microcontrollers, Embedded C and Python programming.

Unit – I 7 Hours

Embedded Computing:

Introduction, Complex Systems and Microprocessors, Embedded Systems Design Process.
Experimental Demonstration on Arduino Uno / Nano / Mega /
Micro Self-Study: CPU Power Consumption.

Unit – II 7 Hours

Introduction To Internet Of Things:
Definition and Characteristics of IoT, physical design of IoT, IoT Protocols, IoT communication models, Communication protocols, IoT Levels and Templates. Overview of Microprocessor and Microcontroller.
Experimental Demonstration on Arduino Uno / Nano / Mega /
Micro Self-Study: Basics of Sensors and actuators.

Unit – III 7 Hours

Prototyping IoT:
IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software, Technology & Protocols. Domain Specific IoTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.
Experimental Demonstration on Arduino Uno / Nano / Mega / Micro

Self-Study: IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software

Unit – IV **7 Hours**

IoT Architecture And Protocols: Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model. Protocols- 6LowPAN, RPL, CoAP, MQTT.
Experimental Demonstration on Raspberry Pi / Orange Pi
Self-Study: Registering a device, De-register a device.

Unit – V **7 Hours**

Cloud Services For IoT: Introduction to Cloud Storage models and communication APIs Web-Server Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.
Experimental Demonstration on Raspberry Pi / Orange Pi
Self-Study: Amazon Web services for IoT.

Text Book:

1. Wayne Wolf: Computers as Components, Principles of Embedded Computing Systems Design, 2nd Edition, Elsevier, 2008. (UNIT I)
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things (A Hands-on-Approach)" **,** 1st Edition, VPT, 2014. (UNIT 2,4,5)
3. Internet of Things Quick Guide - PDF https://www.tutorialspoint.com/internet_of_things/internet_of_things_quick_guide.htm (UNIT 3)

Reference Book:

1. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
2. Marco Schwartz, "Internet of Things with Arduino: Build Internet of Things Projects With the Arduino Platform**".**

Course Outcome (COs):

At the end of the course, the student should be able to:		Blooms Level
1.	**Illustrate** the functionality of Microprocessors, Complex Systems, Embedded System and IoT.	**L2**
2.	**Identify** the skills of interfacing sensors and actuators with IoT systems, using IoT protocols and communication models.	**L2**
3.	**Design** software programs Domain Specific IOT applications.	**L3**
4.	**Apply** Architecture Reference Models for IoT applications	**L3**
5.	**Analyze** the Cloud Storage models and Web services for IoT.	**L4**

Program Outcome of this course (POs)	PO No.
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
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.	**PO2**
3. **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.	**PO5**
4. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO9**
5. **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.	**PO10**

Course delivery methods	Assessment methods
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment Tests
4. NPTEL / EDUSAT	4. Course Seminar
5. Class Room Exercises	5. Course Project (Mini project)

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Journal and lab test **OR** Project report and intermediate evaluation	Total Marks
Maximum marks :50	30	20	50
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Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Initial write up stating the objectives, methodology and the outcome	10 marks	50 marks
	Presentation (PPT) of the project	15 marks	
	Hardware project: Exhibiting and demonstration of working of project. Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the	25 marks	

	project.		
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

EMPLOYABILITY SKILLS - II

Course Code		**Credits**	MNC
Course type	MNC	**CIE Marks**	50 marks
Hours/week: L-T-P	3 – 0 – 0	**SEE Marks**	-
Total Hours:	Lecture = 30 Hrs; Tutorial = 00Hrs Total = 30 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. The course is designed to develop the employability skills of a student.

Unit - I **6 Hours**

Quantitative Aptitude: Time, Speed and Distance (3)
Verbal Ability: Change of Speech and Voice (3)

Unit – II **6 Hours**

Quantitative Aptitude: Permutation and Combination (2)
Logical Reasoning: Coding and Decoding (1), Syllogisms (1.5)
Soft Skills: Interview Skills (1.5)

Unit - III 6 Hours

Quantitative Aptitude: Probability (2),
Logical Reasoning: Data Sufficiency (1), Clocks (1.5), Calendars (1.5)

Unit – IV **6 Hours**

Quantitative Aptitude: Alligation and Mixtures (2), Data Interpretation (1)
Logical Reasoning: Cubes (1)
Verbal Ability: Closet Test (2)

Unit - V **6 Hours**

Quantitative Aptitude: Simple and Compound Interest (2), Ages (1)
Soft Skills: Resume Writing (1.5), Group Discussions – Mock (1.5)

Books

Text Books:

1. How to prepare for Quantitative Aptitude for CAT & other Management Examinations,

Arun Sharma, McGraw Hill Education(India) Private Limited, 4th Edition, 2018.
2. How to prepare for Logical Reasoning for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.
3. How to prepare for Verbal Ability and Reading Comprehension for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.
4. How to prepare for Data Interpretation for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 5th Edition, 2018.

Course Outcome (COs)

At the end of the course, the student will be able to	**Bloom's Level**
1. Clear the Aptitude round of recruiters during placements	
2. Perform confidently during the GD and Interview process	
3. Develop resumes that are grammatically correct and written in Business English	
4. Develop behaviors that are appropriate for a professional	

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	1
2. **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.	3
3. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9

Course delivery methods	**Assessment methods**
1. Black Board Teaching	1. Internal Assessment
2. Power Point Presentation	2. Assignment
3. Class Room Exercise	3. Quiz

Scheme of Continuous Internal Evaluation (CIE):

Components	Average of best two IA tests out of three	Average of two Online Tests	Class Participation	Total Marks
Maximum Marks: 50	25	15	10	50
➢ **Writing two IA tests is compulsory.** ➢ **Minimum marks required to qualify for SEE : 20 out of 50**				

Self Study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 (out of 100)**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

DATA SCIENCE LABORATORY
(Lab)

Course Code	18ISL67	**Credits**	1.5
Course type	LAB	**CIE Marks**	25 marks
Hours/week: L-T-P	0 – 0 – 3	**SEE Marks**	25 marks
Total Hours:	40	**SEE Duration**	3 Hours for 50 marks

Course learning objectives

1. To study and analyze various Data set for application and apply modeling technique.
2. To understand different machine learning algorithm used.

Prerequisites: Any programming language

List of experiments(Using appropriate data analytical tools)

1. Predict the price of a house by applying linear regression to using suitable dataset of real estate business.
2. Apply k-nearest neighbor algorithm to classify and analyze the ionosphere data.
3. Classify the messages as spam and ham using naïve bayes algorithm on sms dataset.
4. Implement logistic regression algorithm on the iris flower dataset to classify the flower into different types.

Text Books:

Cathy O'Neil, Rachel Schutt " Doing Data Science",: O'Reilly Media, Inc.

Reference Books:

Sinan Ozdemir , " Principles of Data Science",Packt publisher December 2016.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Analyze data set and Model for specific applications	L3
2. Apply machine learning algorithm to a application	L4

Program Outcomes of the course — **POs**

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems — **PO1**
2. **oblem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. — **PO2**
3. **nduct 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 conclusion. — **PO4**
4. **odern 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 limitations. — **PO5**

Assessment methods

1. Regular Journal Evaluation & Attendance Monitoring.
2. Lab Internal Assessment.

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks

	for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

ARTIFICIAL INTELLIGENCE LAB

Course Code	18ISL68	Credits	1.5
Course type	LAB	CIE Marks	25 marks
Hours/week: L-T-P	0 – 0 – 3	SEE Marks	25 marks
Total Hours:	30	SEE Duration	3 Hours for 50 marks

Course learning objectives

1. Understand the standards and syntax of PROLOG programming language
2. Explore various searching algorithms
3. Understand the working of Expert systems

Pre-requisites : DAA

List of experiments

Part A

1. Study PROLOG standards and syntaxes.
2. Wrte a POLOG PROGRAM to FIND PERMUTATION OF A SET, CONCATENATE TWO SETS and to FIND MEMBER OF A SET.

3. Wrte a POLOG to PERFORM INTERSECTION OF TWO LISTS,INTERSECTION OF TWO LIST and.UNION OF TWO LISTS

4. Wrte a POLOG for a MENUDRIVEN PROGRAM FOR MEMBER, CONCATENATION, ADD, DELETE AND PERMUTATION FUNCTIONS.

5. Design an algorithm for **TO SOLVE EIGHT QUEENS PROBLEM and develop a PROLOG program for the same.**
6. Design an algorithm for **TO** IMPLEMENT DEPTH FIRST SEARCH **and develop a PROLOG program for the same.**
7. Design an algorithm for **TO** IMPLEMENT BREADTH FIRST SEARCH **and develop a PROLOG program for the same.**
8. Design an algorithm for **TO** TO SOLVE MONKEY BANANA PROBLEM **and develop a PROLOG program for the same**

Part B

The students will design and implement their proposed project on Expert systems.

Text Books:

1. Stuart Russel, Peter Norvig: Artiificial Intelligence A Modern Approach, Pearson 3rd edition 2013.

At the end of the course, the student will be able to	**Bloom's Level**
1. Implement fundamentals of PROLOG programming	**L3**
2. Develop PROLOG programs for Logic building, problem solving, reasoning	**L3**
3. Develop PROLOG programs for and Expert system	**L3**

Program Outcome of this course (POs)	**PO No.**
1. **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**
2. **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations	**6**

3. **Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge. **12**

Assessment methods

1. Periodic journal evaluation
2. Execution of lab experiments.

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE : 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		