

## **Detailed Scheme and Syllabus**

**ACADEMIC YEAR 2021-2022**

**VII - VIII (2018-2022 BATCH) (175Credits)**

**Dr. Ambedkar Institute of Technology  
Bangalore**



**Department Of  
Information Science and Engineering**

**Vision**

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

**Mission**

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

**DEPARTMENT VISION AND MISSION****Vision:**

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

**Mission:**

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

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)**

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

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

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

## **PROGRAM SPECIFIC OBJECTIVES(PSOS)**

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

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

### **PROGRAMME OUTCOMES (POs)**

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

**Dr. Ambedkar Institute of Technology, Bengaluru-560 056**  
**SCHEME OF TEACHING AND EXAMINATION from Academic Year 2020-2021**  
**B.E Information Science and Engineering**  
**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)**

**VII SEMESTER**

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18HS71/72	CMEP / OSHA	IM/CV	2	--	--	03	50	50	100	2
2	PC	18IS71	Big Data Analytics	ISE	4	-	--	03	50	50	100	4
3	PC	18IS72	Software Testing	ISE	4	--	--	03	50	50	100	4
4	PE	18IS73X	Elective-3	ISE	3	--	--	03	50	50	100	3
5	PE	18IS74X	Elective-4	ISE	3	--	--	03	50	50	100	3
6	OE	18ISE03	Open-Elective C	ISE	3	--	--	03	50	50	100	3
7	PC	18ISL75	Big Data Analytics Lab	ISE	--	--	2	03	50	50	100	1
8	PC	18XXL76	Software Testing Lab		--	--	2	03	50	50	100	1
9	Project	18ISP77	Project Work Phase-1	ISE	--	--	2	03	50	--	50	2
10	INT	18ISI78	Internship	(If not completed after VI semester examinations , it has to be carried out during the intervening vacations of VII and VIII semesters )				03	---	--	--	--
TOTAL					19		4	27	400	350	750	23

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

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

<b>Electives</b>		
<b>Course</b>	<b>Electives - 3</b>	<b>Open Elective -B</b>
18IS731	Artificial Neural Networks	<p>Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department.</p> <p>Selection of an open elective is not allowed provided,</p> <ul style="list-style-type: none"> <li>• The candidate has studied the same course during the previous semesters of the programme.</li> <li>• The syllabus content of open elective is similar to that of Departmental core courses or professional electives.</li> <li>• A similar course, under any category, is prescribed in the higher semesters of the programme.</li> </ul> <p>Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.</p>
18IS732	C# Programming and .Net	
18IS733	Software Architecture	
18IS734	BlockChain Technology	
Course Code	<b>Electives – 4</b>	
18IS741	Storage Area Network	
18IS742	Ethical Hacking	
18IS743	Soft and Evolutionary Computing	
18IS744	Deep Learning	
<b>Course code</b>	<b>Open Elective -C</b>	
18ISE031	Mobile Application Development	
18ISE032	Python Programming	
18ISE033	Artificial Intelligence	

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

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

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VIII SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	MC	18IM 81 /18CV81	CMEP / OSHA	IM/CV	4	--	--	03	50	50	100	2
2	Project	18ISP82	Project Work phase-2	ISE		-	--	03	50	50	100	10
3		18ISS83	Technical Seminar	ISE	-	--	-	03	50	50	100	1
4	INT	18ISI84	Internship	ISE	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semester)			03	50	50	100	2
TOTAL					5		4	14	200	200	400	15
Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course												
Electives												
Internship: Those, who have not pursued /completed the internship will be declared as failed and have to complete during subsequent SEE examination after they satisfy the internship requirements												
CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration												

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

## **VII SEMESTER**



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

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

**Course Objectives:**

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

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

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

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

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

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

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

**Assignment -III from Unit 5**

Course Outcomes:

After completing the course the students are able to:

CO1: Describe Big data and use cases from selected industry domains.

CO2: Discuss about NoSQL Big data management.

CO3: Install, configure, and run Hadoop.

CO4: Perform Mapreduce analytics using Hadoop.

CO5: Use Hadoop related tools such as HBase, MongoDB, Pig ,Spark, Hive for Big Data Analytics.

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

Text Book(s):

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

Reference Books:

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

Web Resources:

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

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

<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. Discuss about terminologies of software testing .</li> <li>2. Differentiate the various testing techniques.</li> <li>3. Analyze the problem and derive suitable test cases.</li> <li>4. Apply suitable technique for designing of flow graph.</li> <li>5. Explain the need for planning and monitoring a process.</li> </ol>
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<b>Unit No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
1	Basics of Software Testing: Basic definitions, Software Quality , Requirements, Behaviour and Correctness, Correctness versus Reliability, Testing and Debugging, Test cases, Insights from a Venn diagram, Identifying test cases, Test-generation Strategies, Test Metrics, Error and fault taxonomies , Levels of testing, Testing and Verification, Static Testing. Problem Statements: Generalized pseudocode, the triangle problem, the NextDate function, the commission problem, the SATM (Simple Automatic Teller Machine) problem, the currency converter, Saturn windshield wiper T1:Chapter1, Chapter2. T3:Chapter1.	10
2	Functional Testing: Boundary value analysis, Robustness testing, Worst-case testing,Robust Worst testing for triangle problem, Nextdate problem and commission problem, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations, Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Fault Based Testing: Overview, Assumptions in fault based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. T1: Chapter 5,Chapter 6,Chapter7, T2: Chapter 16	10

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

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

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

CO1: Derive test cases for any given problem

CO2: Compare the different testing techniques

CO3: Classify the problem into suitable testing model

CO4: Apply the appropriate technique for the design of flow graph.

CO5: Create appropriate document for the software artefact.

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

**TEXT BOOKS:**

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008. (Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 13)
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009. (Listed topics only from Chapters 3, 4, 16, 17, 20,21, 22,24)
3. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.( Listed topics only from Section 1.2 , 1.3, 1.4 ,1.5, 1.8,1.12,6. 2.1,6. 2.4 )

**REFERENCE BOOKS/WEBLINKS:**

1. Software testing Principles and Practices – Gopalaswamy Ramesh, Srinivasan Desikan, 2 nd Edition, Pearson, 2007.
2. Software Testing – Ron Patton, 2nd edition, Pearson Education, 2004.
3. The Craft of Software Testing – Brian Marrick, Pearson Education, 1995.
4. Anirban Basu, Software Quality Assurance, Testing and Metrics, PHI, 2015.
5. <https://www.softwaretestingmaterial.com/software-testing/>
6. <https://www.guru99.com/software-testing-introduction-importance.html>

<b>Sub Title : ARTIFICIAL NEURAL NETWORKS</b>		
<b>Sub Code: 18IS731</b>	<b>No. of Credits:3 =3 : 0 : 0 (L-T-P)</b>	<b>No. of lecture</b>
<b>Exam Duration : 3 hours</b>	<b>Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100</b>	<b>Total No. of</b>

**Course Objectives:**

1. Understand the basics of ANN and comparison with Human brain
2. Provide knowledge on Generalization and function approximation and various architectures of building an ANN
3. Provide knowledge of reinforcement learning using neural networks
4. Provide knowledge of unsupervised learning using neural networks.

<b>UNIT No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
<b>1</b>	Introduction: Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks. Learning: Learning Algorithms, Error correction and Gradient Descent Rules, Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem.L1, L2	<b>7</b>
<b>2</b>	Supervised Learning: Perceptron learning and Non Separable sets, $\alpha$ -Least Mean Square Learning, MSE Error surface, Steepest Descent Search, $\mu$ -LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm. L1, L2, L3	<b>9</b>
<b>3</b>	Support Vector Machines and Radial Basis Function: Learning from Examples, Statistical Learning Theory, Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.L1, L2, L3	<b>7</b>
<b>4</b>	Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.L1, L2, L3	<b>7</b>
<b>5</b>	Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM, Growing Neural Gas.L1, L2, L3	<b>9</b>



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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1:** Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.

**CO2:** Understand the concepts and techniques of neural networks through the study of important neural network models.

**CO3:** Evaluate whether neural networks are appropriate to a particular application..

**CO4:** Apply neural networks to particular application.

**CO5:** Analyze the steps needed to improve performance of the selected neural network.

**Text Book:** Neural Networks A Classroom Approach– Satish Kumar, McGraw Hill Education (India) Pvt. Ltd, Second Edition.

**Reference Books:**

1. Introduction to Artificial Neural Systems-J.M. Zurada, Jaico Publications 1994.
2. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

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

<b>Sub Title : C# PROGRAMMING AND .NET</b>		
<b>Sub Code:18IS732</b>	<b>No. of Credits:3=3 : 0 : 0 (L-T-P)</b>	<b>No. of Lecture Hours/Week : 3</b>
<b>Exam Duration : 3 hours</b>	<b>Exam Marks :CIE +Assignment + Group Activity+ SEE = 45 + 5 +5 + 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

**Course Objectives:**

1. Understand the nature of .Net application development and build C# applications.
2. Familiarize with Object-oriented Programming concepts as associated with C#, Inheritance, Interfaces, Exception Handling, Reflection, Standard I/O programming, File Handling, Generics,
3. Understand Windows Application using Winforms, File I/O, XML in .NET.Web Services and Deployment.
4. Overview of .NET framework 3.0 features like WPF, WCF and WF.

<b>Unit No.</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
1	<p><b>The Philosophy Of .Net:</b> Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries ( aka Assemblies ), the Role of the Common Intermediate Language , The Role of .NET Type Metadata, The Role of the Assembly Manifest, Compiling CIL to Platform –Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime.</p> <p><b>Building C# Applications:</b> The Role of the Command Line Compiler (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# “Preprocessor:” Directives, An Interesting Aside: The System. Environment Class.<b>T1:Ch1,Ch2</b></p>	8
2	<p><b>C# Language Fundamentals:</b> The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing,</p>	8

	Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces. <b>T1:Ch3</b>	
3	<p><b>Object- Oriented Programming With C#:</b> Forms Defining of the C# Class, Definition the “Default Public Interface” of a Type, Recapping the Pillars of OOP, The First Pillars: C#’s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields, The Second Pillar: C#’s Inheritance Supports, keeping Family Secrets: The “Protected” Keyword, Nested Type Definitions, The Third Pillar: C #’s Polymorphic Support, Casting Between.</p> <p><b>Exceptions And Object Lifetime:</b> Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handling, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System. System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of “new”, The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type. <b>T1:Ch4,Ch5,Ch6</b></p>	8
4	<p><b>Interfaces And Collections:</b> Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type).</p> <p><b>Understanding Callback Interfaces, Understanding the .NET Delegate</b> Type,Members of System. Multicast Delegate, The Simplest Possible DelegateExample, , Building More a Elaborate Delegate Example, UnderstandingAsynchronous <b>T1:Ch7,Ch8</b></p>	8
5	Delegates, Understanding (and Using)Events.The Advances Keywords of C#, A Catalog of C# Keywords Building aCustom Indexer, A Variation of the Cars Indexer Internal Representation ofType Indexer . Using C# Indexer from VB .NET. Overloading operators, TheInternal Representation of Overloading Operators, interacting with OverloadOperator from Overloaded- Operator- Challenged Languages,	7

	<p>Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Custom Conversion Routines</p> <p><b>Understanding .Net Assemblies:</b> Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types, Building the Multifile Assembly, Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private Assemblies XML Configurations Files, Probing for Private Assemblies (The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly. <b>T1:Ch9,Ch10,Ch11</b></p>	
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**Note 1: All units will have internal choice**

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

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

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

**Assignment -III from Unit 5**

#### **Course Outcomes:**

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

**CO1:**Analyze the nature of .Net application development .

**CO2:**Apply OOAD concepts to build C# applications

**CO3:**Design and develop console based applications using C#

**CO4:**Develop Windows Application using Winforms, File I/O, XML in .NET.Web Services and deployment.

**CO5:**Analyze .NET framework 3.0 features like WPF, WCF and WF.

<b>COs</b>	<b>Mapping with POs</b>
CO1	PO1,PO2,PO3,PO4,PO5,PO8
CO2	PO1,PO2,PO3,PO4,PO5,PO7
CO3	PO1,PO2,PO3,PO4,PO5,PO7
CO4	PO1,PO2,PO3,PO4,PO5,PO7
CO5	PO1,PO2,PO3,PO4,PO5,PO7

#### **TEXT BOOKS:**

1. Pro C# with .NET 3.0 - Andrew Troelsen, Special Edition, Dream Tech Press, India, 2013.
2. Programming in C# - E. Balagurusamy, 5<sup>th</sup> Reprint, Tata McGraw Hill, 2011.

#### **REFERENCE BOOKS/WEB LINKS:**

Inside C# - Tom Archer, WP Publishers, 2011.

<b>Sub Title : SOFTWARE ARCHITECTURE</b>		
<b>Sub Code:18IS733</b>	<b>No. of Credits:3=3 : 0 : 0 (L-T-P)</b>	<b>No. of Lecture Hours/Week : 3</b>
<b>Exam Duration : 3 hours</b>	<b>Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

### Course Objectives:

1. Understanding the fundamentals of software architecture.
2. Software architecture and quality requirements of a software system
3. Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
4. Methods, techniques, and tools for describing software architecture and documenting design rationale.
5. Software architecture design and evaluation processes.

<b>Unit No.</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
1	<b>Introduction:</b> The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a “good” architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views. Architectural Styles and Case Studies: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. T1:CH:1,CH2	8
2	<b>Quality:</b> Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. <b>Achieving Quality:</b> Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles. T1:CH4,CH5	8
3	<b>Architectural Patterns – 1:</b> Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control. T1:CH2	8
4	<b>Architectural Patterns – 2:</b> Adaptable Systems: Microkernel; Reflection.	8

	Some Design Patterns: Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy. T2:CH3	
5	<b>Designing and Documenting Software Architecture:</b> Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views. T1:CH7,CH8	7

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1:**Argue the importance and role of software architecture in large scale software systems

**CO2:**Design and motivate software architecture for large scale software systems

**CO3:**Recognize major software architectural styles, design patterns, and frameworks

**CO4:**Describe a software architecture using various documentation approaches and architectural description languages

**CO5:** Evaluate the coming attractions in software architecture research and practice.

COs	Mapping with POs
CO1	PO1,PO2,PO9
CO2	PO1,PO2, PO4,PO5, PO9
CO3	PO1, PO4,PO5, PO9
CO4	PO1,PO2,PO3, PO4, PO9
CO5	PO1, PO4, PO9,PO10

## **TEXT BOOKS**

1. Software Architecture in Practice - Len Bass, Paul Clements, Rick Kazman, 2<sup>nd</sup> Edition, Pearson Education, 2003.
2. Pattern-Oriented Software Architecture A System of Patterns, Volume 1 - Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006
3. Software Architecture- Perspectives on an Emerging Discipline - Mary Shaw and David Garlan, Prentice-Hall of India, 2007.

## **REFERENCE BOOKS/WEB LINKS:**

Design Patterns- Elements of Reusable Object-Oriented Software - E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995.

<b>Sub Code:</b> 18IS734	<b>No. of Credits:</b> 3=3: 0 : 0 (L-T-P)	<b>No.of Lecture Hours/Week: 3</b>
<b>Exam Duration :</b> <b>3 hours</b>	<b>Exam Marks: CIE +Assignment + Group Activity + SEE =</b> <b>40 + 5 +5+ 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Understand the fundamentals of BlockChain.</li> <li>2. Understand the concept of decentralization, its impact, and its relationship with blockchain technology</li> <li>3. Gain knowledge of the inner workings of blockchain and the mechanisms behind bitcoin and alternative cryptocurrencies.</li> <li>4. Understand the theoretical foundations of smart contracts</li> <li>5. Identify and examine applications of the blockchain technology - beyond currencies</li> </ol>
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<b>UNIT No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
<b>1</b>	Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain. Text Book 1: Chapter 1	<b>8</b>
<b>2</b>	Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys Text Book 1: Chapter 2,Chapter 4	<b>8</b>
<b>3</b>	Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash Text Book 1: Chapter 3, Chapter 6, Chapter 8.	<b>8</b>
<b>4</b>	Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts. Text Book 1: Chapter 10	<b>8</b>
<b>5</b>	Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, 08 Media Text Book 1: Chapter 17	<b>7</b>

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

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

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

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

**Assignment -III from Unit 5**



**Course Outcomes:**

After the completion of the course students will be able to

**CO1:** Comprehend the fundamentals of Blockchain Technology.

**CO2:** Apply the methods of Decentralization.

**CO3:** Analyse Bitcoin and alternative coins.

**CO4:** Analyze the importance of Smart Contracts and Ethereum

**CO5:** Apply blockchain technology in various fields like Government, Health finance etc.,

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

**TEXT BOOKS:**

1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017

**REFERENCE BOOKS / WEBLINKS:**

1. Blockchain Technology (Concepts and applications), Kumar saurabh, Ashutosh saxena, Wiley, 2020.
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten, 2016.
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017.
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014.
5. <https://www.packtpub.com/in/big-data-and-business-intelligence/mastering-blockchain-second-edition>

#### ELECTIVES-4

Sub Title : <b>STORAGE AREA NETWORKS</b>		
Sub Code: 18IS741	No. of Credits:3=3 : 0 : 0 (L-T-P)	No. of Lecture Hours/Week : 3
Exam Duration : 3 hours	Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100	Total No. of Contact Hours : 39

#### **Course Objectives:**

1. To understand the fundamentals of storage architecture along with storage virtualization.
2. To understand the metrics used for designing storage area networks.
3. To enable the students to understand RAID concepts.
4. To appreciate the use of cables technologies used in SAN technology.

Unit No.	Syllabus Content	No. of Hours
1	<b>Storage System</b> Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.Data Center Environment: Application, Host (Compute), Connectivity, Storage.Data Protection: RAID: RAID Implementation Methods, RAID Techniques,RAID Levels, RAID Impact on Disk Performance. Intelligent Storage Systems:Components of Intelligent Storage System, Storage Provisioning. <b>T1: Ch1: 1.2 to 1.4, Ch2: 2.1, 2.3 to 2.5, Ch3: 3.1, 3.3 to 3.5, Ch4: 4.1 and 4.2</b>	8
2	<b>Storage Networking Technologies</b> Fibre Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning,FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP,FCoE. Network Attached Storage: Components of NAS, NAS I/O Operation,NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage,Unified Storage. T1 :Ch5: 5.3, 5.4, 5.6, 5.9 to 5.11, Ch6: 6.1 to 6.3, Ch7: 7.4, 7.5, 7.7 and 7.9 Ch 8: 8.1, 8.2 and 8.4	8
3	<b>Backup, Archive and Replication</b> Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, BC Technology Solutions. Backup and Archive: Backup Methods, Backup Topologies, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive. Local Replication: Replication Terminology, Uses of Local Replicas, Local Replication Technologies, Local Replication in a Virtualized Environment. Remote Replication: Remote Replication Technologies, Three-Site Replication, Remote Replication and Migration in a Virtualized Environment.	8

	T1: Ch10: 10.5, 10.8, 10.10 to 10.13, Ch11: 11.1, 11.2, 11.4 and 11.8, Ch12: 12.2, 12.3 and 12.5	
4	<b>Cloud Computing and Virtualization</b> Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service Models, Cloud Deployment Models, Cloud Computing Infrastructure, Cloud Challenges and Cloud Adoption Considerations. Virtualization Appliances: Black Box Virtualization, In-Band Virtualization Appliances, Outof-Band Virtualization Appliances, High Availability for Virtualization Appliances, Appliances for Mass Consumption. Storage Automation and Virtualization: Policy-Based Storage Management, Application-Aware Storage Virtualization, Virtualization-Aware Applications. T1: Ch13: 13.1 to 13.8. T2: Ch9: 9.1 to 9.5 Ch13: 13.1 to 13.3	8
5	<b>Securing and Managing Storage Infrastructure</b> Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments. <b>Managing the Storage Infrastructure</b> Monitoring the Storage Infrastructure, Storage Infrastructure Management activities, Storage Infrastructure Management Challenges, Information Lifecycle management, Storage Tiering. T1 : Ch14: 14.1 to 14.5, Ch15: 15.1 to 15.3, 15.5 and 15.6	7

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

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

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

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

**Assignment -III from Unit 5**

#### **Course Outcomes:**

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

**CO1:** Identify the need for storage networks and its advantages.

**CO2:** Recognize various RAID levels.

**CO3:** Apply the concept of storage virtualization and recognize steps for Business continuity planning in an Enterprise.

**CO4:** Analyze SAN architecture along with the use of cables technologies.

**CO5:** Realize the concept of management of storage network.

<b>COs</b>	<b>Mapping with POs</b>
CO1	PO1, PO2, PO12
CO2	PO1, PO2
CO3	PO1, PO2, PO11
CO4	PO1, PO2, PO12
CO5	PO1, PO2, PO11, PO12

**TEXT BOOKS:**

1. Information Storage and Management, Author : EMC Education Services, Publisher: Wiley  
ISBN: 9781118094839
2. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company  
ISBN : 9780321262516

**REFERENCE BOOKS/WEB LINKS:**

1. Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011.
2. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.
3. Richard Barker and Paul Massiglia: "Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs", Wiley India, 2006

<b>Sub Title: ETHICAL HACKING</b>		
<b>SubCode: 18IS742</b>	<b>No. of Credits:3 = 3: 0 : 0 (L–T– P)</b>	<b>No of Lecture Hour/week: 3</b>
<b>Exam Duration: 3 Hours</b>	<b>CIE + SEE = CIE+Assignment+Group Activity= 40+5+5+50 =100</b>	<b>Total No. of Contact Hours : 39</b>

**Course Objectives:**

- Learn aspects of security, importance of data gathering, foot printing and system hacking.
- Learn tools and techniques to carry out a penetration testing.
- How intruders escalate privileges
  - Explain Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
- Compare different types of hacking tools..

<b>Unit No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
<b>1</b>	Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring. <b>Text Book2: Chapter1:Page 7-42:Chapter2: Page 43-77, Chapter3: Page 79-148</b>	<b>8</b>
<b>2.</b>	Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local Access, After Hacking root. <b>Text Book2: Chapter5:Page 224-307</b>	<b>8</b>
<b>3.</b>	Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, BruteForce Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media. <b>Text Book2: Chapter6:Page 315-369,Chapter7: Page 387-439</b>	<b>8</b>
<b>4.</b>	Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS <b>Text Book2: Chapter8:Page 445-466,Text Book1: Chapter11: Page 459-479, Chapter12: Page 483-504</b>	<b>8</b>
<b>5.</b>	Remote Control Insecurities: Discovering Remote Control Software, Connection, Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced	<b>7</b>

	Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking <b>Text Book1: Chapter13: Page 511-526, Chapter14: Page 529-563, Chapter15: Page 565,Chapter16: Page 601-651</b>	
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**Note 1: All units will have internal choice**

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:** After the successful completion of the course the students are able to

**CO1:** Explain aspects of security, importance of data gathering, foot printing and system hacking

**CO2:** Explain aspects of security, importance of data gathering, foot printing and system hacking.

**CO3:** Demonstrate how intruders escalate privileges.

**CO4:** Demonstrate how intruders escalate privileges

**CO5:** Demonstrate how intruders escalate privileges.

<b>COs</b>	<b>Mapping with POs</b>
CO1	PO1, PO2
CO2	PO1, PO2
CO3	PO1, PO2
CO4	PO1, PO4
CO5	PO1, PO2

### **TEXT BOOKS:**

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, 2<sup>nd</sup> Edition, Tata Mc Graw Hill Publishers, 2010.
2. Stuart McClure, Joel Scambray and Goerge Kurtz, “Hacking Exposed Network Security Secrets & Solutions”, 6th Edition, Tata Mc Graw Hill Publishers, 2010.
3. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall

### **REFERENCE BOOKS/WEB LINKS**

1. Stuart McClure, Joel Scambray and Goerge Kurtz, “Hacking Exposed Network Security Secrets & Solutions”, 6th Edition, Tata Mc Graw Hill publishers, 2010.
2. Rafay Baloch, “A Beginners Guide to Ethical Hacking”
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, “Gray Hat Hacking The Ethical Hackers Handbook”, 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

<b>Sub Title: SOFT AND EVOLUTIONARY COMPUTING</b>		
<b>Sub Code:</b> <b>18IS743</b>	<b>No. of Credits:3=3 : 0 : 0 (L-T-P)</b>	<b>No. of lecture hours/week : 3</b>
<b>Exam Duration :</b> <b>3 hours</b>	<b>Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

<p><b>Course objectives:</b> This course will enable students to:</p> <ul style="list-style-type: none"> <li>• Define and understand important concepts in soft computing</li> <li>• To gain insight onto Fuzzy logic</li> <li>• To gain knowledge in machine learning through GA</li> <li>• Analyze the various soft computing techniques</li> </ul>
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<b>Unit No.</b>	<b>Syllabus Content</b>	<b>No. of Hours</b>
<b>1</b>	<p><b>INTRODUCTION TO SOFT COMPUTING:</b> ANN, FS,GA, SI, ES, Comparing among intelligent systems ANN: introduction, biological inspiration, BNN &amp; ANN, classification, first Generation NN, perceptron, illustrative problems <b>Chapter1: 1.1-1.8(T1), Chapter 2: 2.1-2.6(T1)</b></p>	<b>8</b>
<b>2</b>	<p><b>ADALINE, MADALINE, ANN:</b> (2 generation), Introduction, BPN, KNN,HNN,BAM, RBF,SVM and illustrative problems <b>Chapter 2: 3.1,3.2,3.3,3.6,3.7,3.10,3.11(T1)</b></p>	<b>8</b>
<b>3</b>	<p><b>FUZZY LOGIC:</b> Introduction, human learning ability, undecidability, probability theory, classical set and fuzzy set, fuzzy set operations, fuzzy relations, fuzzy compositions, natural language and fuzzy interpretations, structure of fuzzy inference system, illustrative problems <b>Chapter 5(T1)</b></p>	<b>8</b>
<b>4</b>	<p><b>GENETIC ALGORITHMS:</b> Introduction to GAGA, procedures, working of GA, GA applications, applicability, evolutionary programming, working of EP, GA based Machine learning classifier system, illustrative problems <b>Chapter 7(T1)</b></p>	<b>8</b>

<b>5</b>	<b>Swarm Intelligent system:</b> Introduction, Background of SI, Ant colony system Working of ACO, Particle swarm Intelligence (PSO).  <b>Chapter 8: 8.1-8.4, 8.7(T1)</b>	<b>7</b>
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**Note 1: All Units will have internal choice.**

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

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

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

**Assignment -III from Unit 5**

#### **Course Outcomes:**

After completion of course students will be able to:

**CO1:** Apprehend soft computing techniques

**CO2:** Apply the learned techniques to solve realistic problems

**CO3:** Differentiate soft computing with hard computing techniques

**CO4:** Design a Fuzzy expert system and apply GA for various applications

<b>COs</b>	<b>Mapping with POs</b>
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO3, PO4
CO3	PO3, PO4, PO5, PO6
CO4	PO3, PO4, PO5, P12

#### **TEXT BOOKS:**

1. Soft computing : N. P Padhy and S P Simon , Oxford University Press 2015

#### **REFERENCE BOOKS/WEB LINKS:**

1. Principles of Soft Computing, Sivanandam, Deepa S. N Wiley India, ISBN 13: 2011

2. Vojislav Kecman, “Learning & Soft Computing Support Vector Machines, Neural Networks, and Fuzzy Logic Models”, Pearson Education, New Delhi, 2007.



<b>Sub Title : DEEP LEARNING</b>		
<b>Sub Code: 18IS744</b>	<b>No. of Credits:3=3: 0 : 0 (L-T-P)</b>	<b>No.of Lecture Hours/Week: 3</b>
<b>Exam Duration : 3 hours</b>	<b>Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

**Course Objectives:**

1. To understand basics of artificial neural network.
2. To gain knowledge of Deep Learning algorithms.
3. To get acquainted with a usage of TensorFlow tool.
4. To acquire the knowledge of different CNN architectures.
5. TO understand processing sequences using RNN and CNNs.

<b>UNIT No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
<b>1</b>	<b>Introduction to Artificial Neural Networks with Keras-</b> From Biological to Artificial Neurons, Biological Neurons, Logical Computations with Neurons, The Perceptron, MultiLayer Perceptron (MLP) and Backpropagation, Implementing MLP's with Keras, Fine Tuning Neural Network Hyper Parameters.	<b>8</b>
<b>2</b>	<b>Training Deep Neural Networks-</b> Vanishing/Exploding Gradients, Reusing Pretrained Layers Avoiding Overfitting Through Regularization.	<b>8</b>
<b>3</b>	<b>Custom Models and Training with TensorFlow -</b> A Quick Tour of TensorFlow, Using TensorFlow like NumPy, Customizing Models and Training Algorithms. <b>Loading and Preprocessing Data with TensorFlow –</b> The Data API, The TF Record Format , Preprocessing the Input Features, TF Transform, The TensorFlow Datasets (TFDS) Project.	<b>8</b>
<b>4</b>	<b>Deep Computer Vision Using Convolutional Neural Networks -</b> Architecture of Visual Cortex, Convolutional Layer, Pooling Layer, CNN Architectures, AlexNet, GoogLeNet Using Pre-trained Models from Keras, Classification and Localization, Object Detection, Fully Convolutional Networks.	<b>8</b>
<b>5</b>	<b>Processing Sequences Using RNNs and CNNs -</b> Recurrent Neurons and Layers , Training RNNs, Forecasting a Time Series, Baseline Metrics , Implementing a Simple RNN , Handling Long Sequences- Tackling the Short-Term Memory Problem, LSTM Cell.	<b>7</b>

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

After the completion of the course students will be able to

**CO1:** Comprehend the fundamentals of deep learning algorithms.

**CO2:** Apply specific deep learning algorithms to obtain solutions for appropriate problems.

**CO3:** Identify and analyse deep learning techniques suitable for training the models using tensorflow and keras.

**CO4:** Conduct various experiments to demonstrate techniques using Deep neural networks, Convolutional neural networks, Recurrent neural networks so on.

**CO5:** Usage of modern tools for implementing deep learning algorithms using Python.

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

**TEXT BOOKS:**

1. "Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems – September 2019: Second Edition" by Aurelien Geron.

**REFERENCE BOOKS / WEBLINKS:**

1. "Python Machine Learning- Third Edition" by Sebastian Raschka and Vahid Mirjalili.
2. e-Books:<https://www.oreilly.com/library/view/hands-on-machine-learning/9781492032632/>

## OPEN ELECTIVES -B

<b>Sub Title : MOBILE APPLICATION DEVELOPMENT</b>		
<b>Sub Code:18ISE031</b>	<b>No. of Credits: 3 =3 : 0 : 0 (L-T-P)</b>	<b>No. of lecture hours/week : 3</b>
<b>Exam Duration : 3 hours</b>	<b>Exam Marks: CIE +Assignment +Group Activity= 40+5+5+50 =100</b>	<b>Total No. of Contact Hours :39</b>

### Course Objectives:

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

<b>UNIT No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
1	<b>Platform Overview:</b> Introducing Android – History of Mobile Software Development, The Open Handset Alliance, Android Platform Uniqueness, The Android Platform, Setting Up Your Android Development Environment - Configuring Your Development environment, Exploring the Android SDK. Creating first android application - Testing Your Development Environment, Building Your First Android Application. <b>Application Basics :</b> Understanding Application Components - Mastering Important Android Terminology, The Application Context, Performing Application Tasks with Activities, Organizing Activity Components with Fragments, Managing Activity Transitions with Intents T1: Ch1, Ch2, Ch3,ch4	8
2	<b>Application Basics Continued</b> – Defining the Manifest , Managing Application Resources- What Are Resources?, Adding Simple Resource Values in Android Studio, Working with Different Types of Resources, Working with Layouts, Exploring Building Blocks, Positioning with Layouts, Partitioning with Fragments T1: Ch 5,Ch 6,Ch 7, Ch 8, Ch 9	8
3	<b>Application Design Essentials:</b> Architecting with Patterns-Architecting Your Application's Navigation, Encouraging Action,, Appealing with	8

	Style-Styling with Support, Themes and Styles, Colors, Layout, Embracing Material Design-Understanding Material, The Default Material Theme, Designing Compatible Applications -Maximizing Application Compatibility, Designing User Interfaces for Compatibility, Providing Alternative Application Resources, Targeting Tablets and TVs, Extending Application to Watches and Cars. T1: Ch 10, Ch11, Ch12, Ch 13	
4	<b>Application Development Essentials:</b> Using Android Preferences-Working with Application Preferences, Finding Preferences Data on the File System, Creating Manageable User Preferences, Auto Backup for Android Applications.  Accessing Files and Directories: Working with Application Data on a Device, Practicing Good File Management, Understanding Android File Permissions, Working with Files and Directories,  Saving with SQLite : Working with Databases  Leveraging Content Providers - Exploring Android's Content Providers, Modifying Content Providers Data, Using Third-Party Content Providers T1: Ch 14,Ch15,Ch16, Ch17	8
5	<b>Application Delivery Essentials:</b>  Testing Your Applications - Best Practices in Testing Mobile Applications, Android Application Testing Essentials, More Android Automated Testing Programs and APIs, Distributing Your Applications - Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing to Google Play, Google Play Staged Rollouts, Publishing to the Google Play Private Channel, Translating Your Application, Publishing Using Other Alternatives, Self-Publishing Your Application.  T1: Ch 21 and Ch 22	7

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

After completing the course the students are able to:

**CO1:** Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.

**CO2:** Design Android applications using various resources and built-in classes.

**CO3:**Apply creative skills in designing and deploying the sophisticated mobile applications.

**CO4:** Design and deploy Android applications with compelling User Interfaces and databases.

**CO5:** Develop and publish the Android Application in the global marketplace for download.

<b>COs</b>	<b>Mapping with POs</b>
CO1	PO1, PO2, PO3, PO4
CO2	PO2, PO3, PO4, PO5, PO7
CO3	PO4, PO5, PO6, PO8, PO9
CO4	PO4, PO5, PO9, PO10
CO5	PO6, PO7, PO8, PO11

#### **TEXT BOOK:**

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

#### **REFERENCE BOOKS:**

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

<b>Sub Title : PYTHON PROGRAMMING</b>		
<b>Sub Code:</b> <b>18ISE032</b>	<b>No. of Credits: 3 = 3 : 0 : 0 (L-T-P)</b>	<b>No. of lecture hours/week : 3</b>
<b>Exam Duration :</b> <b>3 hours</b>	<b>Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100</b>	<b>Total No. of Contact Hours : 39</b>

**Course Objectives:**

1. Understanding the syntax and semantics of the Python language.
2. To create Functions in Python.
3. To handle Files & Regular expressions in Python.
4. To apply Object Oriented Programming concepts in Python.
5. To create Threaded and Networking applications in Python .

<b>UNIT No</b>	<b>Syllabus Content</b>	<b>No of Hours</b>
<b>1</b>	Introduction to Python, Writing Our First Python Program, Datatypes in Python, Operators in Python, Input and Output, Control Statements <b>T1: Ch 1, Ch 2, Ch 3, Ch 4, Ch 5 , Ch 6</b>	<b>8</b>
<b>2</b>	Arrays in Python, Strings and Characters, Functions, Lists and Tuples, Dictionaries <b>T1: Ch 7, Ch 8, Ch 9, Ch 10, Ch 11</b>	<b>8</b>
<b>3</b>	Introduction to OOPS, Classes and Objects, Inheritance and Polymorphism, Exceptions <b>Ch12, Ch13, Ch14, Ch16</b>	<b>8</b>
<b>4</b>	Files in Python, Regular Expressions in Python, Data Structures in Python, Date and Time <b>T1: Ch 17, Ch 18 , Ch 19, Ch 20</b>	<b>8</b>
<b>5</b>	Threads, Graphical User Interface, Networking in Python, Python's Database Connectivity <b>T1: Ch 20 , Ch 21, Ch 22, Ch 23</b>	<b>7</b>

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

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

**CO1:** Demonstrate the understanding and usage of core python scripting elements python constructs, data types.

**CO2 :** Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.

**CO3:** Demonstrate the understanding and usage of modules, packages and regular expressions.

**CO4:** Demonstrate usage of object oriented features such as Inheritance, Polymorphism, operator overloading.

**CO5:**Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and networking applications

**Text Books:**

1. Core Python Programming: Dr.R.Nageshwara Rao,Dreadm Tech Press 2018

**Reference Books:**

1. Think Python, Allen Downey, Green Tea Press.
2. Learning Python, Mark Lutz, Orielly.

COs	Mapping with POs
CO1	PO1,PO2,PO4
CO2	PO1,PO2,PO4
CO3	PO1,PO2,PO4,PO5,PO8
CO4	PO1,PO2,PO4,PO5,PO8
CO5	PO1,PO2,PO4,PO5,PO8

**Sub Title : ARTIFICIAL INTELLIGENCE**

<b>Sub Code:</b> <b>18ISE033</b>	<b>No. of Credits:3=3: 0 : 0 (L-T-P)</b>	<b>No. of Lecture Hours/Week :3</b>
<b>Exam Duration :</b> <b>3 hours</b>	<b>Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100</b>	<b>Total No. of Contact Hours :39</b>

**Course Objectives:**

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

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

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

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

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

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

**Assignment -III from Unit 5**

**Course Outcomes:**

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



**CO1:** Describe the modern view of AI as the study of agents that receive percepts and perform actions.  
**CO2:** Apply AI search Models and Generic search strategies.  
**CO3:** Write Logic for representing Knowledge and Reasoning of AI systems.  
**CO4:** Design different learning algorithms for improving the performance of AI systems.  
**CO5:** Implement projects using different AI learning techniques

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

#### TEXT BOOKS:

- 1.“Artificial Intelligence: A Modern Approach ” by Stuart Russel, PeterNorvig, 2nd Edition, Pearson Education, 2003.
- 2.“Artificial Intelligence” by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata McGraw Hill 3rd edition. 2013

#### REFERENCE BOOKS/WEBLINKS:

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

E Books:

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

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

<b>Sub Title : BIG DATA AND ANALYTICS LAB</b>		
<b>Sub Code:18ISL75</b>	<b>No of Credits : 0:0:1(L:T:P)</b>	<b>No. of Lecture Hours/Week : 02</b>

<b>Exam Duration :</b> <b>3hours</b>	<b>Exam Marks :CIE + SEE = 50 + 50 =100</b>
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<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. To understand the concept of Big data with hands on.</li> <li>2. Understand installation of various Big data tools under Hadoop.</li> <li>3. To apply Hadoop concepts to various applications and NoSQL implementation.</li> </ol>
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## I. LIST OF PROGRAMS

1.Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the `hadoop fs` command when interacting with HDFS.

- a. Review the commands available for the Hadoop Distributed File System:
- b. Copy file `foo.txt` from local disk to the user's directory in HDFS
- c. Get a directory listing of the user's home directory in HDFS
- d. Get a directory listing of the HDFS root directory
- e. Display the contents of the HDFS file `user/fred/bar.txt`

2. Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the `hadoop fs` command when interacting with HDFS.

- a. Move that file to the local disk, named as `baz.txt`
- b. Create a directory called `input` under the user's home directory
- c. Delete the directory `input` and all its contents
- d. Verify the copy by listing the directory contents in HDFS.

3. Demonstrate word count on an input file using MapReduce program.

4. Using movie ratings data, Develop the queries in Hive for the following-

- a. List all the Users who have rated the movies (Users who have rated at least one movie)
- b. List of all the User with the max, min, average ratings they have given against any movie
- c. List all the Movies with the max, min, average ratings given by any user

5. In this program you will use HiveQL to filter and aggregate click data to build facts about user's movie preferences. The query results will be saved in a staging table used to populate the Oracle Database.

The `moveapp_log_json` table contains an activity column. Activity states are as follows:

- RATE\_MOVIE
- COMPLETED\_MOVIE

- PAUSE\_MOVIE
  - START\_MOVIE
  - BROWSE\_MOVIE
  - LIST\_MOVIE
  - SEARCH\_MOVIE
  - LOGIN
  - LOGOUT
  - INCOMPLETE\_MOVIE.
  - PURCHASE\_MOVIE
- a. Write a query to select only those clicks which correspond to starting, browsing, completing, or purchasing movies. Use a CASE statement to transform the RECOMMENDED column into integers where 'Y' is 1 and 'N' is 0. Also, ensure GENREID is not null. Only include the first 25 rows.
  - b. Write a query to select the customer ID, movie ID, recommended state and most recent rating for each movie.
6. The moveapp\_log\_json table contains an activity column. Activity states are as follows:
- RATE\_MOVIE
  - COMPLETED\_MOVIE
  - PAUSE\_MOVIE
  - START\_MOVIE
  - BROWSE\_MOVIE
  - LIST\_MOVIE
  - SEARCH\_MOVIE
  - LOGIN
  - LOGOUT
  - INCOMPLETE\_MOVIE.
- a. Load the results of the previous two queries into a staging table. First, create the staging table:
  - b. Next, load the results of the queries into the staging table.
7. Write R program to:
- a. Create two matrices and perform multiplication & division on those matrices.
  - b. Create a data frame and print the: data frame, structure of data frame and summary of data frame.
  - c. Create a Bar chart and sketch the Bar chart by taking months as input & plot it against revenue. Also, add legend to the chart that includes regions.

## II. OPEN ENDED QUESTIONS

1. Installation and Configuration of Hadoop software on stand alone system.
2. Installation and Configuration of Hadoop software on Ubuntu cluster system.
3. Highest temperature year wise using MapReduce.

**NOTE:**

1. **STUDENT IS PERMITTED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**
2. **STUDENT IS REQUIRED TO EXECUTE ONE PROGRAM FROM PART A and ONE PROGRAM FROM PART B .**

**Course Outcomes:**

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

CO1: Elucidate installation of various Big data tools under Hadoop.

CO2: Implement HiveQL statements.

CO3: Differentiate between SQL and NoSQL commands.

COs	Mapping with POs
CO1	PO2,PO5,PO7,PO11
CO2	PO5, PO7,PO12
CO3	PO7,PO9,PO10,PO12

<b>Subject : SOFTWARE TESTING LAB.</b>		
<b>Sub Code:18ISL76</b>	<b>No. of Credits : 0:0:1</b>	<b>No. of lecture hours/week : 02</b>
<b>Exam Duration : 3 hours</b>	<b>CIE + SEE = 50 + 50 =100</b>	

**Course objectives:**

1. Analyse the requirements for the given problem statement
2. Design and implement various solutions for the given problem
3. Employ various design strategies for problem solving.
4. Construct control flow graphs for the solution that is implemented
5. Create appropriate document for the software artifact

## I. LIST OF PROGRAMS

1. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, execute the test cases and discuss the results.
2. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.
3. Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.
4. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.
5. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of equivalence class testing, derive different test cases, execute these test cases and discuss the test results.
6. Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.

7. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.
8. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.
9. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.
10. Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.
11. Design, develop, code and run the program in any suitable language to implement the quicksort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.
12. Design, develop, code and run the program in any suitable language to implement an absolute letter grading procedure, making suitable assumptions. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results

## II. OPEN ENDED QUESTIONS

1. Study of testing tool (e.g. winrunner)
2. Study of web testing tool (e.g. selenium)
3. Study of bug tracking tool (e.g. bugzilla)
4. Study of any test management tool (e.g. test director)
5. Study of any open source testing tool (e.g. test link)

### NOTE :

1. Student is permitted to submit open ended solution to any other open ended question apart from the list above . but it has to be approved by the staff in charge.
2. In the examination each student picks one question from a lot of all 12 questions.

Sub Title : PROJECT WORK PHASE -I
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<b>Sub Code:18 ISP77</b>	<b>No. of Credits: 2</b>	

<b>Sub Title : INTERNSHIP</b>		
<b>Sub Code:18 ISI78</b>	<b>No. of Credits: 2</b>	

## VIII SEMESTER

<b>Sub Title : CMEP/OSHA</b>		
<b>SubCode: 18IM81 /</b> <b>18CV81</b>	<b>No. of Credits: 2</b>	



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