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# SACRED HEART COLLEGE (AUTONOMOUS)

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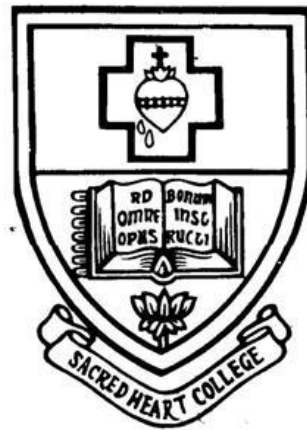
A Don Bosco Institution of Higher Education, Founded in 1951 \* Affiliated to Thiruvalluvar University, Vellore \* Autonomous since 1987

Accredited by NAAC (4<sup>th</sup> Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

## MASTER OF COMPUTER SCIENCE

### REGULATIONS AND SYLLABUS

(Effective from Academic Year 2021 – 2022)



POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE

SACRED HEART COLLEGE (AUTONOMOUS)

TIRUPATTUR, VELLORE 635 601

# M.Sc Computer Science

Sem	Code	Subject	L	T	P	C	CA	Sem	Total
I		Principles of Compiler Design	4	0	0	3	50	50	100
		Advanced Java Programming	4	1	0	3	50	50	100
		Desktop Applications	4	1	0	3	50	50	100
		Open Source Technologies	3	1	0	3	50	50	100
		<b>Elective-I:</b> a. Web Services b. Data Mining and Warehousing c. Business Intelligence	4	0	0	3	50	50	100
		Practical – I: Advanced Java Programming	0	0	2	2	50	50	100
		Practical –II : Desktop Applications	0	0	2	2	50	50	100
		Practical – III: Open Source Technologies	0	0	2	2	50	50	100
		Employability Skills	2	0	0	0	100	-	100
		MOOCs	-	-	-	2 <sup>#</sup>	-	-	-
	<b>Total</b>	<b>21</b>	<b>3</b>	<b>6</b>	<b>21+2<sup>#</sup></b>	<b>-</b>	<b>-</b>	<b>30</b>	
II		Distributed Operating System	4	0	0	3	50	50	100
		Enterprise Java Programming	4	1	0	3	50	50	100
		Web Applications	4	1	0	3	50	50	100
		Programming in Python	3	1	0	3	50	50	100
		<b>Elective-II:</b> a. Object Oriented Analysis and Design b. Software Testing and Quality Assurance c. Wireless Sensor Networks	4	0	0	3	50	50	100
		Practical - IV: Enterprise Java Programming	0	0	2	2	50	50	100
		Practical - V: Web Applications	0	0	2	2	50	50	100
		Practical -VI: Programming in Python	0	0	2	2	50	50	100
		Technical Aptitude	2	0	0	-	100	-	100
		Skill Empowerment – I	0	0	0	1	100	-	100
	Department Domain – I (30 Hrs) / MOOCs	-	-	-	2 <sup>*</sup>	-	-	-	
	<b>Total</b>	<b>21</b>	<b>3</b>	<b>6</b>	<b>22+2<sup>*</sup></b>	<b>-</b>	<b>-</b>	<b>30</b>	
III		Internet Of Things	4	0	0	3	50	50	100
		Artificial Intelligence	4	0	0	3	50	50	100
		Design and Analysis of Algorithms	4	1	0	3	50	50	100
		Mobile Applications	4	1	0	3	50	50	100
		<b>Elective - III:</b> a. Semantic Web and Applications b. Ethical Hacking & Cyber Forensics c. Cloud Computing	4	0	0	3	50	50	100
		Practical-VII: Design and Analysis of Algorithms	0	0	2	2	50	50	100
		Practical – VIII: Mobile Applications	0	0	2	2	50	50	100
		Software Project – I	0	0	2	2	50	50	100
		Career Building Skills	2	0	0	-	100	-	100
		Industrial Plant Training	0	0	0	2	100	-	100
	Skill Empowerment – II	0	0	0	1	100	-	100	
	MOOCs	-	-	-	2 <sup>*</sup>	-	-	-	
	<b>Total</b>	<b>22</b>	<b>2</b>	<b>6</b>	<b>24+2<sup>*</sup></b>	<b>-</b>	<b>-</b>	<b>30</b>	
IV		Big Data Analytics	4	-	0	3	50	50	100

	Data Science with Python	4	1		3	50	50	100
	Machine Learning	4	1	0	3	50	50	100
	<b>Elective-IV:</b>					50	50	
	a. Cryptography and Network Security							
	b. Social Network Analysis	4	0	0	3			100
	c. Soft Computing							
	Practical - IX: Data Science with Python	0	0	2	2	50	50	100
	Practical - X: Machine Learning	0	0	2	2	50	50	100
	Software Project – II	0	0	4	3	50	50	100
	Human Rights	2	0	0	2	50	50	100
	Research Investigation	2	0	0	1	100	-	100
	Skill Empowerment – III	0	0	0	1	100	-	100
	<b>Department Domain – II(30 Hrs)</b>	-	-	-	<b>2<sup>#</sup></b>	-	-	-
	<b>Total</b>	<b>20</b>	<b>2</b>	<b>8</b>	<b>23+2<sup>#</sup></b>	-	-	<b>30</b>
	<b>Grand Total</b>	<b>84</b>	<b>10</b>	<b>26</b>	<b>90+4<sup>#</sup>+4*</b>	-	-	<b>120</b>

**PRINCIPLES OF COMPILER DESIGN****LEARNING OBJECTIVES**

- To know the basic concepts of compilers.
- To explore the phases of a compiler
- To know how the source program is executed in the compiler.
- To bring in the types of grammar
- To create a new compiler

**UNIT - I: INTRODUCTION**

Generation of Programming Languages - Language processing systems - Introduction to Compiling – Compilers - Analysis of the source program - The phases -The grouping of phases - Compiler construction tools - Token- Pattern- Lexeme- The role of the lexical analyzer –Two methods used in input buffering.

**UNIT - II: LEXICAL ANALYSIS**

C program to detect tokens in a C program - Specification of tokens – Strings and languages- Operations on languages- Regular Expressions- Definitions- Design of lexical analyzer- Recognition of tokens- A language for specifying lexical analyzer.

**UNIT - III: SYNTAX ANALYSIS**

Syntax Analysis - The role of the parser – Error Recovery Strategies- Grammars- Context - free grammars -Writing a grammar – Derivations- Ambiguity- Top-down parsing – Bottom - up Parsing.

**UNIT - IV: INTERMEDIATE CODE GENERATION**

Intermediate languages – Declarations - Assignment statements - Boolean expressions - Case statements – Backpatching - Procedure calls.

**UNIT - V: CODE GENERATION AND OPTIMIZATION**

Issues in the design of a code generator - The target machine - Run-time storage management -Basic blocks and flow graphs - Next-use information- Principal sources of Optimization.

**TEXT BOOK**

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, “Compilers- Principles, Techniques, and Tools”, Pearson Education Asia, 2006
2. S. GodfreyWinster, S. Aruna Devi, R. Sujatha, “Compiler Design”, Yes Dee Publishing, 2018.

**REFERENCES**

1. David Galles, “Modern Compiler Design”, Pearson Education Asia, 2007
2. Steven S. Muchnick, “Advanced Compiler Design & Implementation”, Morgan Kaufmann Pulishers, 2000
3. C.N.Fisher and R.J.LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2000

**WEB REFERENCES****Online Tutorial**

<http://www.dreamincode.net/forums/topic/268945-an-introduction-to-compiler-design-part-ii-parsing>  
<https://ideone.com/>

**Online Quiz**

<http://www.avatto.com/computer-science/test/mcqs/compiler-design/questions/131/1.html>

**LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- Specify and analyze the lexical, syntactic and semantic structures of advanced language features
- Separate the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation
- Write a scanner, parser, and semantic analyzer without the aid of automatic generators
- Turn fully processed source code for a novel language into machine code for a novel computer
- Describe techniques for intermediate code and machine code optimization
- Design the structures and support required for compiling advanced language features.

#### BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ADVANCED JAVA PROGRAMMING****LEARNING OBJECTIVES**

- To introduce programming with Applet and AWT.
- An overview of database access and details for managing information using the JDBC API.
- Examine the use of networking and collections.
- Learn how to program Servlet and JSP.
- To understand the web programming concepts in the perspective of Client and Server.

**UNIT -I: APPLETS AND GUI**

Applet Fundamentals- Applet Class - Applet lifecycle- **Steps for Developing Applet Programs**- Passing Values through Parameters- Graphics in Applets; GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes –Other Swing Controls: File Choosers - Color Choosers – Tree – Table –Tabbed pane–Option pane - Progressive bar - Sliders.

**UNIT- II: JDBC AND JAVA NETWORKING**

JDBC -Introduction - **JDBC Architecture** - **JDBC Classes and Interfaces** – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking-Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and InetAddressclasses.

**UNIT- III: COLLECTIONS AND DESIGN PATTERNS**

Collection Framework - ArrayList class - LinkedList class - ArrayListvs Linked List - ListIterator interface - HashSet class, LinkedHashSet class, TreeSet class PriorityQueue class - Map interface, HashMap class, LinkedHashMapclass ,TreeMap class - Comparable interface , Comparator interface, Comparable vs Comparator; **Design Patterns**: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern, Adapter Pattern, Proxy Pattern, Decorator Pattern, Command Pattern, Template Pattern, Mediator Pattern;

**UNIT -IV: SERVLET AND JSP**

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – GenericServlet,HttpServlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies; JSP : **JSP Engines Working with JSP** - **JSP and Servlet** –Java Bean Component - Anatomy of a JSP Page.

**UNIT -V: WEB PROGRAMMING**

**Client-Side Programming**: Client-side programming technologies - Form design using HTML and CSS, XHTML and DHTML - Client side validation Using JavaScript - Content Structuring using XML - Adding Interactivity with AJAX -**JQuery Framework**;  
Server-side Programming: Web Servers - Handling request and response - Handling Form data - Session management - Database Access- Multimedia: Images- Animation.

**TEXT BOOK**

1. S. Sagayaraj, R. Denis, P.Karthik& D. Gajalakshmi “Java Programming”, Universities Press, 2018.

**REFERENCES**

1. Patrick Naughton& Herbert Schildt, "The Complete Reference: Java 2", Tata McGraw Hill, 1999.
2. Deitel&Deitel, "Java How to Program", Prentice Hall, 5th Edition, 2002
3. Peter Hagggar, "Practical Java: Programming Language Guide", Addison-Wesley Pub Co, 1st Edition, 2000.
4. C.Muthu, "Programming with Java", McGraw Hill, Second Edition, 2008

**WEB REFERENCES**

<http://math.hws.edu/javanotes/c6/index.html>  
<http://www.tutorialspoint.com/awt/>  
[www.studytonight.com](http://www.studytonight.com)  
[www.javatpoint.com](http://www.javatpoint.com)  
[www.learnjavaonline.org](http://www.learnjavaonline.org)  
[www.codingbat.com](http://www.codingbat.com)

### LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Develop Applet Programming using various techniques
- Develop applications using Abstract Window Toolkit and Events
- Update and retrieve the data from the databases using JDBC-ODBC
- Develop server side programs in the form of Servlets
- Build up Java Applications using collections and JSP Tags.

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	<b>ANSWER ALL</b>	2	2	2	2	2	2	10
B	<b>EITHER OR TYPE</b>	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**WINDOWS APPLICATIONS****LEARNING OBJECTIVES**

- To know the differences between desktop and web application.
- To construct classes, methods, and accessor and instantiate objects.
- To create and manipulate GUI components in C#.
- To code solutions and compile C# projects within the .NET framework.
- To build own desktop application with Database

**UNIT - I: INTRODUCTION TO C#**

Introduction to .NET – Features of C# - Data Types – Value Types – Reference Types - Variables and Constants – Declaring – Assigning values – variables of nullable types – Operators – **Type Conversions** – Implicit and Explicit Type Conversions – Arrays – Single Dimensional and Multidimensional – Control Flow Statements – Selection – Iteration and Jump – **Classes and Objects** – Access Modifiers – Defining a Class – Variables – Properties and Methods – Creating Objects – **Constructor and Destructors.**

**UNIT - II: WINDOWS FORMS**

Windows Forms – Form Class – Common Operations on Forms – Creating a Message Box – Handling Events – Mouse Events – Keyboard Events – Common Controls in Windows Forms – Label – TextBox – Button – Combo Box – List Box – Check Box – Radio Button – Group Box – Picture Box – Timer – Open File Dialog – Save File Dialog – Font Dialog – Color Dialog – Print Dialog – Tree View – Menu.

**UNIT - III: REFLECTION AND REMOTING**

Life Cycle of threads-Using Reflection – Reflecting the Members of a Class - Dynamic Loading and Reflection - .NET Remoting – **Architecture** – Hosting of Objects – Single Ton and Single Call – Remoting Server – Remoting Client.

**UNIT - IV: WINDOWS PRESENTATION FOUNDATION (WPF)**

Introduction – Architecture of WPF – Common Controls: Grid Control – Button Control – TextBox Control – PasswordBox Control – TextBlock Control – Border Control – Grid Splitter Control – Canvas Control – StackPanel Control.

**UNIT - V: DATABASE**

Creating Connection String – Creating a Connection to a Database – Creating a Command Object – Working with Data Adapters – Using Data Reader to work with Databases – Using Dataset.

**TEXT BOOKS**

1. Vikas Gupta , “Comdex .NET Programming “ , Dream Tech Press, New Delhi, 2011
2. Kogent Solutions, “ C# 2008 Programming Black Book”, Dream Tech Press, New Delhi, Platinum Edition, 2009

**REFERENCES**

1. Rebecca M.Riordon, “Microsoft ADO .Net 2.0 Step by Step”, Prentice Hall of India Private Limited, New Delhi, 2007
2. David S.Platt , “Introducing Microsoft .Net”, Prentice Hall of India( Private) Limited, Third Edition, New Delhi, 2006

**WEB REFERENCES****Online Tutorial**

<http://csharp.net-tutorials.com/index.php>  
<http://csharp.net-tutorials.com/classes/introduction/>  
<http://www.homeandlearn.co.uk/csharp/csharp.html>



**Online Quiz**

<http://www.indiabix.com/c-sharp-programming/questions-and-answers/>

<https://www.wiziq.com/online-tests/43860-c-basic-quiz>

<http://www.withoutbook.com/OnlineTestStart.php?quizId=71>

**Online Compiler**

[http://www.compileonline.com/compile\\_csharp\\_online.php](http://www.compileonline.com/compile_csharp_online.php)

<http://www.ideone.com>

**LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- To know the differences between desktop application and web application.
- To construct classes, methods, and access modifier and instantiate objects.
- To create and manipulate GUI components in C# for windows application.
- To code solutions and compile C# projects within the .NET framework.
- To build the desktop application with Database.

**BLUE PRINT OF THE SEMESTER QUESTION PAPER**

Section	Type and Choice	Marks	Number of Questions from					Total Questions
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	<b>ANSWER ALL</b>	2	2	2	2	2	2	10
B	<b>EITHER OR TYPE</b>	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**OPEN SOURCE TECHNOLOGIES****LEARNING OBJECTIVES**

- To learn designing webpage using HTML & CSS
- To understand the concept of Database
- To learn Server side scripting language
- To introduce applications using PHP with MYSQL

**Unit - I: HTML**

Text Formatting – Presentational, Phrase Elements – Lists- Character Entities for Special Characters – Creating Links - Links and Navigation - Table Elements and Attributes - **Form Controls** – Frames – Frameset, Frame, noframes – Creating Links between Frames – Nested Framesets.

**Unit - II: CSS**

Introduction to Cascading Style Sheets – Types of CSS – CSS properties – Text Formatting – Links – Backgrounds -Positioning with CSS – Div – Class - CSS Website Layout using Div and Class - Creating simple navigation menu using CSS.

**Unit - III: PHP**

Introduction to Apache web server and PHP – Downloading and installing of Apache WebServer - Difference between Server Side Scripting and Client Side Scripting - Creating First Hello World PHP file – Opening of PHP file – **Combining PHP and HTML** - Declaring Variable - Declaring and Using Constants - Variable Scope - Using Operators- Making Decisions with Conditionals - Repeating Actions through Iteration - Accessing Form Variables.

**Unit - IV: MYSQL**

Introduction to MYSQL - The Show Databases and Table Commands - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement – **Creating applications using HTML, CSS, PHP and MYSQL (CRUD Operations).**

**Unit - V: JSON and Real Time Website Design and Implementation Technique**

Introduction to JSON - JSON Syntax- Data types- creating JSON objects- Parsing JSON- **Development of Application using JSON** – Introduction to website – Selecting Domain Name for website from different providers (GoDaddy, HostGator) – Components of real time websites – Hosting a website in to the server – Free hosting providers.

**TEXT BOOKS**

1. Jon Duckett, “Web Programming with HTML, CSS & JavaScript”, Wiley Publishing, 2005.
2. HTML5 Black Book, 2<sup>nd</sup> Edition, DT Editorial Services, DreamTech press publishing, 2016.
3. Luke Welling, Laura Thomson “PHP and MySQL Web Development” Pearson Education Inc., Fourth Edition, 2008
4. Jsn for Beginners by iCode Academy, 2017.
5. Introduction to JavaScript Object Notation by Lindsay basset, O’reilly 2015.
6. James Lee and Brent Ware, "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", James Lee and Brent Ware, Dorling Kindersley(India) Pvt. Ltd, 2008

**REFERENCES**

1. Alexis Goldstein, Louis Lazaris, Estelle Weyl. “Html5 & CSS3 for the Real World”.
2. Eric Rosebrock, Eric Filson, "Setting up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004
3. Steven D. Nowicki, Alec Cove, HeowEide-goodman, “Professional PHP”, Wrox Press, 2004.
4. Shawn M. Lauriat, “Advanced Ajax Architecture and Best Practices”, Prentic Hall, 2008

## WEB REFERENCES

### Online Tutorial

<http://my.safaribooksonline.com/book/databases/mysql/020177061x>  
[www.w3schools.com](http://www.w3schools.com),  
[www.php.net](http://www.php.net),  
[www.phpclasses.org](http://www.phpclasses.org)

### Online Quiz

[http://www.w3schools.com/html/html\\_quiz.asp](http://www.w3schools.com/html/html_quiz.asp)  
[http://www.realinformation.net/Apache\\_Server\\_Popquiz.htm](http://www.realinformation.net/Apache_Server_Popquiz.htm)  
<http://www.withoutbook.com/OnlineTestStart.php?quizId=31>  
<http://www.myphpquiz.com/>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Design webpages using HTML & CSS
- Know the purpose and usage of a Database
- Develop applications using Server side scripting language
- Develop applications using PHP with MYSQL

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
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C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – I: A. WEB SERVICES****LEARNING OBJECTIVES**

- To examine fundamental XML technology
- To understand the use of JSON
- To gain an understanding about the role of web services in commercial applications
- To learn the emerging standard protocols like SOAP, WSDL and UDDI.
- To introduce the role of web services in CMS

**UNIT - I: XML TECHNOLOGY FAMILY**

XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based standards – **DTD – XML Schemas** – X-Files – XML processing – **DOM – SAX** – presentation technologies – XSL – XHTML – voiceXML – Transformation – **XSLT – XLINK – XPATH**.

**UNIT - II: JSON AND JSON SCHEMA**

Introduction to JSON – JSON Comparison with XML – JSON syntax, Datatypes, Objects – Examples – **JSON Schema**: Hello World! – The type Keyword – Declaring a JSON schema – JSON schema reference: Type specific keywords – Generic Keywords – Combining schemas – The \$schema Keyword – Regular Expression – Structuring a complex schema: Reuse.

**UNIT - III: ARCHITECTING WEB SERVICES**

Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – **Service-oriented Architecture (SOA)** – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.

**UNIT - IV: WEB SERVICE BUILDING BLOCKS: SOAP, WSDL AND UDDI**

Introduction to SOAP – Basic SOAP syntax – Sending SOAP messages – Future of SOAP – **Introduction to WSDL** – Basic WSDL syntax- SOAP binding – **Introduction of UDDI** – UDDI API – Future of UDDI.

**UNIT - V: XML-E-BUSINESS & XML-CONTENT MANAGEMENT SYSTEM**

Business to Business – Business to Customer – Different types of B2B Interaction – Components of E-business XML Systems – Enterprise Integration – ebXML – RosettaNet – Introduction of **Web Content Management** – Components of Content Management System – Role of XML in Web Content Management – **Role of metadata (RDF and PRISM) in Web Content Management**.

**TEXT BOOKS**

1. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2002.
2. Micheal Droettboom, “Understanding JSON Schema Release 1.0”, 2013.

**REFERENCES**

1. Ethan Cerami, “Web Services Essentials”, O’Reilly, Shroff Publishers & Distributors Pvt.Ltd, Fourth Edition, 2002.
2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Prentice Hall Edition, 2004.

**WEB REFERENCES**

www.w3schools.com/xml/  
 https://www.tutorialspoint.com/xml/  
 www.xmlmaster.org/en/article/d01/  
 www.quackit.com/xml/tutorial/  
 www.tutorialspoint.com/webservices/  
 www.javatpoint.com/web-services-tutorial  
 tutorials.jenkov.com/web-services/

## LEARNING OUTCOMES

On completion of this course you should be able to:

- Understand the use of web services in B2C and B2B applications.
- Understand the design principles and application of SOAP and REST based web services.
- Design collaborating web services according to a specification.
- Implement an application that uses multiple web services in a realistic business scenario.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE-I : B. DATA MINING AND WAREHOUSING****LEARNING OBJECTIVES**

- To understand data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To expose the students to the concepts of data warehousing architecture and implementation
- To study the overview of developing areas – web mining, text mining and ethical aspects of data mining
- To identify business applications and trends of data mining

**UNIT- I: DATA MINING AND PREPROCESSING**

Data Mining - Kinds of Data – Kinds of patterns –Used technology – Kinds of Applications – Issues in Data mining .Know Your Data: Data objects and Attributes Types –Basic Statistical Description of Data – Data Visualization – Measuring Data Similarity and Dissimilarity. Data Processing –Data Cleaning – Data Integration – Data Reduction –Data Transformation and data Discretization.

**UNIT - II: DATA WAREHOUSING AND OLAP**

Data Warehousing –Data Warehouse Architecture- Design and Usage –Data Warehouse Implementation – OLAP operations- ROLAP- MOLAP-Association Rules:AprioriAlgorithm- FP- tree Growth Algorithm.

**UNIT - III: CLASSIFICATION TECHNIQUES**

Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based classification –Model Evaluation and Selection – Techniques to Improve Classification Accuracy.

**UNIT - IV: CLUSTER ANALYSIS**

Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods.

**UNIT - V: WEB MINING**

Web Content Mining- Web Structure Mining- Web Usage Mining- Text Mining- Unstructured Text- Episode rule discovery for texts- hierarchy of categories- Text Clustering- Temporal Data Mining- rules-sequence mining- Time Series Analysis- Spatial Mining- tasks-clustering-trends.

**TEXT BOOKS**

1. JiaweiHan, MichelineKamber and Jian Pei, “Data Mining Concepts and Techniques”, Morgan Kauffmann Publishers, Third Edition, 2012
2. Arun K Pujari, “Data Mining Techniques”, Universities Press (India) private Limited, Fourth Edition, 2017.

**REFERENCES**

1. K.P. Soman, ShyamDiwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006
3. Berson, Alex & Smith, Stephen J, “Data Warehousing, Data Mining, and OLAP”, TMH Pub.Co. Ltd, New Delhi, 2012
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Pearson Education, 2007

## WEB REFERENCES

<http://www.scribd.com/doc/5710731/mining-background-literature-review>  
<http://www.scribd.com/doc/104389040/Why-Mining>  
<http://www.scribd.com/doc/6283008/Data-Integration-Data-Mining-Clinical-Research>  
<http://www.selectbs.com/products-general/what-is-business-intelligence>  
<http://www.scribd.com/doc/30346964/Business-intelligence>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Evolve multidimensional intelligent model from typical system
- Discover the knowledge imbibed in the high dimensional system
- Evaluate various mining techniques on complex data objects
- Students able to apply classification and clustering techniques
- Know about web mining and its concepts

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – I: C. BUSINESS INTELLIGENCE****LEARNING OBJECTIVES**

- To introduce the idea of decision making in complex industrial and service environments
- To understand the science behind better predictions and decisions
- To generate an ability to design, analyze and perform experiments on real life problems using various Decision making methodologies.
- Critically evaluate use of BI for supporting decision making in an organisation.
- Understand and use the technologies and tools that make up BI

**UNIT - I: INTRODUCTION AND CHARACTERISTICS OF COMPLEX BUSINESS PROBLEMS**

Introduction to decision making methods, **AHP, SAW,VIKOR, WPM MCDM,MADM** methods and examples Number of Possible Solutions, Time-Changing Environment, Problem Specific Constraints, Multi-objective Problems, Modeling the Problem, A Real-World Example

**UNIT – II: ADAPTIVE BUSINESS INTELLIGENCE AND PREDICTION METHODS AND MODELS**

Data Mining, Prediction, Optimization, Adaptability, the **Structure of an Adaptive Business Intelligence System, Data Preparation**, Different Prediction Methods, Mathematical Methods, Distance Methods: Logic Methods, Modern Heuristic Methods Additional Considerations, Evaluation of Models.

**UNIT - III: MODERN OPTIMIZATION TECHNIQUES**

Local Optimization Techniques, Stochastic Hill Climber, Simulated Annealing, Tabu Search, Evolutionary Algorithms, Constraint Handling.

**UNIT – IV: COMPUTATIONAL INTELLIGENCE AND EXPERT TECHNIQUES IN DECISION MAKING**

Design of an expert system for decision making using **Neural Network, fuzzy logic and genetic algorithm**, Classifiers, Evolutionary Computation: Ant colony optimization, Particle Swarm optimization.

**UNIT – V: HYBRID SYSTEMS AND ADAPTIVE BUSINESS INTELLIGENCE MARKETING**

Hybrid Systems for Prediction, Hybrid Systems for Optimization, Adaptability, Campaigns, Manufacturing, Investment Strategies, Emergency Response Services, Credit Card Fraud.

**TEXT BOOKS**

1. Zbigniew Michalewicz, Martin Schmidt, Matthew Michalewicz, Constantin Chiriac, "Adaptive Business Intelligence", Springer Publications.
2. Venkata Rao, "Decision Making in the Manufacturing Environment: Using Graph Theory and Fuzzy Multiple Attribute Decision Making Methods", Springer publications.
3. Da Ruan, "Computational Intelligence in Complex Decision Systems", Atlantis Press, Amsterdam Press, World Scientific.
4. Hans Jurgen Zimmermann, "Fuzzy sets, decision making and expert system", Kluwer Academic Publishers, Boston.
5. B Carlo Vercellis "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications.



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- Ralph Kimball, Margy Ross (2002.), The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling, Wiley
- Joe Caserta, Ralph Kimball (2004.), The Data Warehouse Etl Toolkit, Wiley
- Christopher Adamson (2010.), Star Schema The Complete Reference, McGraw Hill

## WEBRESOURCES

- <https://www.tableau.com/learn/articles/10-business-intelligence-blogs>
- [https://en.wikipedia.org/wiki/Business\\_intelligence](https://en.wikipedia.org/wiki/Business_intelligence)
- <https://looker.com/>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Explain the foundations, definitions, and capabilities of DSS, data analytics and BI.
- Demonstrate the impact of business reporting, information visualization, and dashboards.
- Explain data mining, neural networks, support vector machines, text analytics, text mining, sentiment analysis, web mining, web analytics, social analytics, social network analysis.
- Identify the major ethical and legal issues of analytics.
- Describe how analytics are powering consumer applications and creating a new opportunity for entrepreneurship for analytics.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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			Unit I	Unit II	Unit III	Unit IV	Unit V	
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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**DISTRIBUTED OPERATING SYSTEMS****LEARNING OBJECTIVES**

- To understand the fundamental concepts of operating systems
- To understand the need for distributed systems.
- To get acquainted with the design principles of distributed operating systems.
- To explore the concept of synchronization
- To handle the process in distributed environment

**UNIT - I: DISTRIBUTED COMPUTING SYSTEM**

Evolution –Models – Popularity - **Distributed Operating System** – Issues – Distributed Computed Environment.

**UNIT - II: MESSAGE PASSING**

Features of a Good Message Passing – Issues- **Synchronization** – Buffering – Multidatagram Messages – **Encoding and Decoding of Message Data** – Process Addressing – Failure Handling.

**UNIT III: REMOTE PROCEDURE CALL**

The RPC Model –Transparency – Implementation – Stub – Messages – Marshaling - Server Management –Parameter Passing Semantics – Call Semantics – Communication protocols – Complicated – Client server Binding – **Exception Handling** – **Security** – Special types – Heterogeneous – Light Weight – Optimization.

**UNIT - IV: SYNCHRONIZATION**

**Mutual Exclusion** - Critical Section –Starvation of process - Three approaches to implement mutual exclusion: Centralized Approach- Distributed Approach – Token Passing Approach – **Deadlock** - Necessary Conditions for Deadlock - Deadlock Modeling - Handling Deadlocks: Prevention – Avoidance.

**UNIT - V: PROCESS MANAGEMENT**

Introduction - **Process Migration**- Desirable Features of a Good Process Migration Mechanism - Process Migration Mechanisms - Process Migration in Heterogeneous Systems - Advantages of Process Migration – Threads - Motivations for Using Threads - Models for Organizing Threads - Issues In Designing a Threads Package.

**TEXT BOOK**

1. Pradeep K. Sinha, "Distributed Operating System Concepts and Design ", PHI, New Delhi, 2007

**REFERENCE**

1. Andrew S Tanaenbaum, "Modern Operating System", PHI, New Delhi, 2001

**WEB REFERENCES****Online Tutorial**

[http://en.wikipedia.org/wiki/Distributed\\_operating\\_system](http://en.wikipedia.org/wiki/Distributed_operating_system)  
<http://www.scribd.com/doc/198503016/Distributed-Operating-Systems>  
<http://it-ebooks.info/book/635/>  
<http://developer.yahoo.com/hadoop/tutorial/>

**Online Quiz**

<http://searchdatamanagement.techtarget.com/quiz/Quiz-Test-your-understanding-of-the-Hadoop-ecosystem>

**LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- Understand the different Distributed Systems and the challenges involved in Design of the Distributed Systems.
- Understand how computing power is created and synchronized in Distributed systems
- Design and Implement Distributed applications using Technologies like RPC, threads.
- Learn how to store data in Distributed File System.
- Understand How Distributed Shared Memory is managed.

#### **BLUE PRINT OF THE SEMESTER QUESTION PAPER**

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
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C	<b>ANY THREE</b>	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ENTERPRISE JAVA PROGRAMMING****LEARNING OBJECTIVES**

- To expose the knowledge of MVC and Java server faces
- To provide the knowledge and skills required to develop web applications using the MVC framework provided by Apache Struts
- To Develop Enterprise web application using EJB.
- To understand and implement the object-relation mapping using Hibernate
- To explore the knowledge of Aspect Oriented Programming using Spring and Spring MVC.

**UNIT - I: INTEGRATING SERVLETS AND JSP, JAVA SERVER FACES**

**JSP:** Basics – Life cycle of JSP- Static and dynamic content- javaBeans components; Understanding the need for MVC: implementing MVC with request dispatcher, summarizing the MVC code, interpreting relative URL, three data sharing approaches; **JSF:** Basics, Framework roles, Simple JSF application, Life Cycle of JSF page, using core tags, using HTML Component tags, Implementing an Event Listener - localized messages, Standard Converters and Validators – Creating a Custom Convertor and validator.

**UNIT- II: STRUTS FRAMEWORK**

Introduction to Struts , Understanding Struts , Struts Flow Control Six Basic steps in using Struts, FormBeans, Forms, Using properties files, Advanced Action, Manual Validation, validation in the Action, validation in the form bean, Struts Tiles, Motivations , Basics, Tiles definitions file.

**UNIT - III: ENTERPRISE JAVA BEANS**

**EJB:** Session Bean, Entity Bean, Message driven Bean, defining clients access with interfaces, life cycle of enterprise Bean, creation of Enterprise Bean, web client, other Enterprise Bean features, handling exceptions, Container- Managed Transactions, Bean Managed Transactions.

**UNIT - IV: HIBERNATE**

Basics- Enterprise Application architectures, Hibernate Motivation, Object Relation Mapping, Collection Mapping, Association Mapping, Collection and Association Relationships, Relationships in Java and Databases, Component Mapping, Inheritance Mapping, Life cycle of Hibernate Entities, Transactions, HQL, Native SQL, Querying Terminology, SQL Query Options, Querying With Hibernate, Hibernate Batch processing and interceptor..

**UNIT - V: SPRING**

Foundation: Motivation- Spring Hello World, Runtime environment, Dependency injection-Inversion of control ,Spring IoC container, Spring framework composition, Spring container instantiation, Spring Bean life cycle, Spring bean definitions and inheritance, Bean naming, Bean scoping, Referencing other beans, Properties integration-Resource integration - Collection mapping, AOP with spring framework, **Spring Web MVC**.

**TEXT BOOKS**

1. Marty Hall, Larry Brown., “Core Servlets and Java Server Pages”, 2nd Edition, Pearson Education, 2004
2. Stephanie Bodoffetl., “The J2EETM Tutorial”, Pearson Education, Second Edition, 2005
3. Hibernate Reference Documentation 3.3.1, Copyright © 2004 Red Hat Middleware, LLC available at [http://www.hibernate.org/hib\\_docs/v3/reference/en/html\\_single/](http://www.hibernate.org/hib_docs/v3/reference/en/html_single/)
4. Gary Mak, Josh Long and Daniel Rubio, “Spring Recipes: A Problem-Solution Approach”, Apress Publications, Second Edition, 2010
5. Craig Walls, ”Spring in action”, Manning Publisher, Third Edition, 2011

**REFERENCES**

1. Cay S.Horstmann, Gary Cornell, “Core Java Volume I – Fundamentals Core Concepts”, Prentice Hall of India, Ninth Edition, 2012

2. Cay S.Horstmann, Gary Cornell, “Core Java Volume II – Advanced Features”, Prentice Hall of India, Ninth Edition, 2013
3. Minter Dave, Linwood Jeff, “Beginning Hibernate, From Novice to Professional”, Apress, Second Edition, 2006
4. Doray, Arnold, “Beginning Apache, From Novice to Professional”, Apress, Second Edition, 2006

## **WEB REFERENCES**

### **Online Tutorial**

<http://courses.coreservlets.com/Course-Materials/struts.html>  
<http://www.roseindia.net/jsp/index.shtml>  
<http://www.oracle.com/technetwork/java/javaee/javaserverfaces-139869.html>  
<http://docs.oracle.com/javaee/1.4/tutorial/doc/JSFIntro.html>  
<http://docs.oracle.com/javaee/6/tutorial/doc/bnaph.html>  
[http://en.wikipedia.org/wiki/JavaServer\\_Faces](http://en.wikipedia.org/wiki/JavaServer_Faces)  
<http://docs.oracle.com/cd/E19879-01/819-3669/bnaph/index.html>  
<http://www.roseindia.net/servlets/index.shtml>  
<http://www.tutorialspoint.com/jsf/>  
<http://www.tutorialspoint.com/ejb/>

### **Online Quiz**

<http://www.withoutbook.com/>  
<http://www.javatpoint.com/>

## **LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- Work with JSP, JSF and Servlet using MVC approach.
- Develop the web applications using the MVC framework provided by Apache Struts
- Develop Enterprise web application using EJB.
- Implement the Object-Relation Mapping technique using Hibernate
- Gets knowledge of Aspect Oriented Programming using Spring and Spring MVC.

**BLUE PRINT OF THE SEMESTER QUESTION PAPER**

Section	Type and Choice	Marks	Number of Questions from					Total Questions
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C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**WEB APPLICATIONS****LEARNING OBJECTIVES**

- To understand the difference between desktop and dynamic web applications.
- To understand the ASP.NET web application execution model.
- To create and modify multi-page Web Form applications and Web Services
- To demonstrate features like flow control, data access and data binding
- To validate forms within an application.

**UNIT - I: INTRODUCTION TO ASP.NET AND WEB FORMS**

Developing ASP.NET Applications - ASP.NET File Types - The bin Directory - Application Updates - A Simple Application from Start to Finish-web.config file **Web Form Fundamentals** - A Simple Page Applet - The Problem With Response.Write - Server Controls - HTML Server Controls - ViewState - The HTML Control Classes - Events - Event Handling Changes - The Currency Converter application-Adding Support for Multiple Currencies - Adding Linked Images - Setting Styles – A Deeper Look at HTML control classes-HTML control events-The HTML control Base class-The HtmlContainerControl Class-The HtmlInputControl Class-The Page class-The Controls collection-The HttpRequest Class-The HttpResponse Class-The ServerUtility Class-Assessing HTML Server controls

**UNIT - II: WEB CONTROLS**

Web Controls - Stepping Up to web Controls - Basic Web Control Classes - The web Control Tags - The WebControl Base Class - Units Enumerated Values - Colors - Fonts - List Controls - Table Controls - AutoPostBack and Web Control Events - How Postback Events Work - The Page Lifecycle - The Greeting Card Applet - Validation and rich Controls- The Calendar Control-Formatting the Calendar-restricting Dates- The AdRotator control-The Wizard control-**Validation**-The Validation Controls -The Validation Process-The Validator Class-A Simple Validation Example –Sever side example-Manual Validation-Understanding Regular Expressions-Literals and MetaCharacters-Finding a Regular expression- A Validated Customer Form - **Web Services** – **Creating and Consuming Web Services.**

**UNIT - III: COMPONENT BASED PROGRAMMING**

Introduction – Creating a Simple Component – Properties and State – Database Components – Consuming the Database Component – Enhancing the Component with Error Handling – Aggregate Information – Data Objects.

**UNIT - IV: CUSTOM CONTROLS AND IMPLEMENTING SECURITY**

**User Controls** – Creating a Simple User Control – Visual Studio.NET Custom Control Support – Independent User Controls – Integrated User Controls – User Control Events – Limitations – Deriving Custom Controls.Determining Security Requirements – Restricted File Types – Security Concepts – ASP.NET Security Model – Security Strategies – Certificates – SSL – Forms Authentication – Web.Config Settings – Login Page – User Lists – Protecting User Passwords with Encryption

**UNIT - V: DATABASE ACCESS WITH COMMAND, ADAPTER AND XML**

**ADO.NET Data Access** - About the ADO.NET Example - Obtaining the Sample Database - Simple Data Access - Simple Data Update - Importing the Namespaces - Creating a Connection - The Connection String SQL - Making the Connection - Defining the Select Command - Using a Command with a DataReader - Updating Data - Using Update - Insert - and Delete Commands - Accessing Disconnected Data - Selecting Disconnected Data - Selecting Multiple Tables - Modifying Disconnected Data - Modifying and Deleting Rows - Adding Information - to a DataSet - Updating Disconnected Data - The Command Builder - Updating a DataTable - Controlling Updates - An Update Example – Using XML - XML’s Hidden Role in .NET - XML Basics - Attributes - Comments - The XML Classes - the XML TextWriter - The XML Text Reader - Working with XML Documents - Reading an XML Document - Searching an XML Document - XML Validation – CreatingXML Schema -XSD Documents - Validating an XML File.

**TEXT BOOKS**

1. Mathew MacDonald, “ASP.NET: The Complete Reference”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006

2. Dino Eesposito, "Introducing Microsoft ASP.NET 2.0", AsokeK.Ghosh, Prentice Hall of India, Eastern Economy Edition, New Delhi, 2006

## REFERENCE

1. Stephen Walther, "ASP.NET 3.5 Unleashed", Pearson Education, Dorling Kindersley Pvt. Ltd, Second Edition, 2008

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### Online Tutorial

<http://www.tutorialspoint.com/asp.net/>

<http://asp.net-tutorials.com/>

<http://csharp.net-informations.com/>

### Online Quiz

<http://www.withoutbook.com/OnlineTestStart.php?quizId=70>

<http://www.quiz-magic.com/quiz/96/441/ASPNET>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- To understand the concept of web applications working process.
- To understand the ASP.NET web application execution model.
- To create and modify multi-page Web Form applications and Web Services.
- To demonstrate features like flow control, data access and data binding.
- To validate forms with in an application.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
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C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20



**PROGRAMMING IN PYTHON****LEARNING OBJECTIVES**

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.

**UNIT - I: INTRODUCTION TO PYTHON**

Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group (Suite) – Quotes in Python - Input, Output and Import Functions - Operators. Data Types and Operations: Numbers-Strings-List-Tuple-Set-Dictionary-Data type conversion

**UNIT - II: FLOW CONTROL & FUNCTIONS**

Flow Control: Decision Making-Loops-Nested Loops-Types of Loops. Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value.

**UNIT - III: MODULES, PACKAGES AND FILE HANDLING**

Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules. File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File - Directories in Python.

**UNIT - IV: EXCEPTION HANDLING AND DATABASE PROGRAMMING**

Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python-DB- connection- creating tables- insert-update-delete-read-transaction control-disconnection.

**UNIT - V: GUI PROGRAMMING**

.Introduction- Tkinter Widgets-Label- Message- Entry-Text- tk message Box- Button- Radio- Check button- List box- Frames- Top level widgets- Menu-Menu button-Scrollbar-scale widget(Slider Widget)- Canvas- Layout Managers- Pack-Place-Grid.

**TEXT BOOKS**

1. Jeeva Jose and P. SojanLal, “Introduction to Computing and Problem Solving with Python”, Khanna Book Publishing Co. (P) Ltd., 2016.
2. Jeeva Jose, “Taming Python by Programming”, Revised Edition, Khanna Book Publishing Co. (P) Ltd., 2019.
3. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.

**REFERENCES**

1. Wesley J. Chun, “Core Python Programming”, Second Edition, Prentice Hall Publication, 2006.
2. Timothy A Budd, “Exploring Python”, Tata McGraw Hill, New Delhi, ISBN: 780071321228

**WEB REFERENCES**

[www.learnpython.org/](http://www.learnpython.org/)  
<https://www.codecademy.com/learn/python>  
<https://www.Codementor.io>  
<https://www.Python.org>

### LEARNING OUTCOMES

On successful completion of the course students will be able to:

- To explore the fundamental concepts of Python
- To understand Basics of Python programming language
- To solve simple problems using Python
- To acquire fundamental knowledge and skills on Python Programming
- To understand the nuances of this language.
- To know the usage of modules and packages in Python
- To familiarize with file concepts in Python
- To familiarize with web concepts using Python.

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE-II: A. OBJECT ORIENTED ANALYSIS AND DESIGN****LEARNING OBJECTIVES**

- To understand the fundamental concepts of UML diagrams.
- To draw diagrams with project documentation.
- To analyze the requirements given by stake holder
- To design the project with examples.
- To understand the Software Development Process

**UNIT - I: INTRODUCTION**

Object oriented development – Evidence for Usefulness of Object Oriented development - Modeling Concepts: Modeling – Abstraction - The Three Models.

**UNIT - II: CLASS MODELING**

Class Modeling: Object and Class Concepts – Link and Association Concepts -Inheritance - Sample Class Model - Navigation of Class Models – Advanced Class Modeling: Advanced Object & Class Concepts - Association Ends -N-ary Associations – Aggregation - Abstract Classes.

**UNIT - III: DYNAMIC MODELING**

State Modeling: Events – States – Transitions & Conditions - State diagrams - State Diagram Behavior - Interaction Modeling: Use Case Models - Sequence Models - Activity Models – Case Study:Online Shopping using the models of use case, sequence and activity..

**UNIT - IV: SYSTEM ANALYSIS**

Process Overview: Development Stages - Development Life Cycle - Domain Analysis: Overview of Analysis - Domain Class Model - Domain State Model - Domain Interaction Model.

**UNIT - V: SYSTEM DESIGN**

System Design: Overview of System Design - Estimating performance - Making a Reuse plan - Breaking a System into Subsystems - Identifying Concurrency-Allocation of Subsystems - Management of Data Storage - Handling Global Resources - Choosing a Software Control Strategy.

**TEXT BOOK**

1. Michael Blaha and James Rumbaugh, “Object-Oriented Modeling and Design with UML”, Prentice Hall of India Private Limited, New Delhi, 2005

**REFERENCES**

1. Ali Bahrami “Object-oriented Systems Development using UML”, McGraw Hill, Boston, 1999
2. John W.Satzinger, Robert B.Jackson, Stephen D.Burd, “Object – Oriented Analysis and Design with Unified Process”, Course Technology, New Delhi, 2005
3. L.Whitten, LonnieD.Bentley, “System Analysis and Design Methods”, Tata McGraw Hill Publishing Company Ltd, Fourth Edition, New Delhi, 1999

## WEB REFERENCES

### Online Tutorial

[www.visual-paradigm.com/product/trainingcenter/demo.jsp](http://www.visual-paradigm.com/product/trainingcenter/demo.jsp)

[www.youtube.com/watch?v=fJW65Wo7IHI](http://www.youtube.com/watch?v=fJW65Wo7IHI)

[en.wikipedia.org/wiki/Unified\\_Modeling\\_Language](http://en.wikipedia.org/wiki/Unified_Modeling_Language)

<http://www.cs.bilkent.edu.tr/~ugur/teaching/cs319/>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- be able to use an object-oriented method for analysis and design
- be able to analyze information systems in real-world settings and to conduct methods such as interviews and observations
- have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other IS development methods and techniques
- know techniques aimed to achieve the objective and expected results of a systems development process
- know different types of prototyping
- know how to use UML for notation

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE II: B. SOFTWARE TESTING AND QUALITY ASSURANCE****LEARNING OBJECTIVES**

- To introduce various approaches, techniques, technologies, and methodologies used in software testing and quality assurance.
- To understand the role of testing in applications
- To learn to design the test cases
- To know the different levels of testing
- To study the state-of-the-art of software testing and quality assurance.

**UNIT I: TESTING BASICS**

Testing as an engineering activity – Role of Process in software quality – Testing as a process – Basic definitions – Software testing principles – The tester's role in a software development organization – Origins of defects – Defect classes – The defect repository and test design – Defect examples – Developer / tester support for developing a defect repository.

**UNIT II: TEST CASE DESIGN**

Introduction to testing design strategies – The smarter tester – Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning – Boundary value analysis – Other black box test design approaches – Black box Testing and COTS – Using white box approach to test design – Test adequacy criteria – Coverage and control flow graphs – Covering code logic – Paths – Their role in white box based test design – Additional white box test design approaches – Evaluating test adequacy criteria.

**UNIT III: LEVELS OF TESTING**

The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests.

**UNIT IV: FUNDAMENTALS OF SOFTWARE QUALITY & QUALITY ASSURANCE**

Software quality - Hierarchical models of Boehm and McCall - Quality measurement - Metrics measurement and analysis - Gilb's approach - GQM Model-Quality tasks - SQA plan - Characteristics - Implementation - Documentation - Reviews and audits.

**UNIT V: QUALITY CONTROL AND RELIABILITY**

Defect prevention and removal - Reliability models - Rayleigh model - Reliability growth models for quality assessment. Case Study: Tools for quality - Ishikawa's basic tools - CASE tools.

**TEXT BOOKS**

1. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003. (Unit (I, II and III)
2. Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003. (Unit IV)
3. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pvt. Ltd., 2002. (Unit 5)

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1. Elfriede Dustin, "Effective Software Testing", Pearson Education, 2003.
2. RenuRajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2003.
3. Mordechai Ben, Menachem and Garry S. Marliss, "Software Quality", Thomson

Asia Pvt. Ltd., 2003.

4. Kamna Malik and Praveen Choudry, "Software Quality: A Practitioner Approach", PHI, 2000.

### WEB REFERENCES

[http://en.wikibooks.org/wiki/Software\\_Quality\\_Assurance](http://en.wikibooks.org/wiki/Software_Quality_Assurance)

### LEARNING OUTCOMES

On successful completion of the course students will be able to:

- research the state-of-the-art, and apply their findings to software testing and quality assurance;
- analyze different approaches to software testing and quality assurance, and select optimal solutions for different situations and projects;
- conduct independent research in software testing and quality assurance and apply that knowledge in their future research and practice;
- evaluate the work of peers constructively by following proven methods of peer-review, and by using the principles of research ethics.

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE-II: C. WIRELESS SENSOR NETWORKS****LEARNING OBJECTIVES**

- To understand the concepts of wireless sensor networks
- To understand the protocols for WSN
- To get exposure on WSN environment with TinyOS and like
- To understand the layered approach in sensor networks
- To design WSN and analyze performance

**UNIT I WIRELESS SENSOR NETWORK ARCHITECTURE**

Introduction to **wireless sensor networks**- Challenges, Comparison with ad hoc network, Node architecture and Network architecture, design principles, Service interfaces, Gateway, Short range radio communication standards-IEEE 802.15.4, Zigbee and Bluetooth. Physical layer and transceiver design considerations.

**UNIT II DATA LINK LAYER**

**MAC protocols** – fundamentals, low duty cycle protocols and wakeup concepts, contentionbased protocols, Schedule-based protocols - SMAC, BMAC, TRAMA, Link Layer protocols – fundamentals task and requirements, error control, framing, link management, Naming and addressing – address assignment, unique, Content-based and geographical addressing.

**UNIT III NETWORK LAYER**

Routing protocols – Requirements, Taxonomy - Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient-based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques, Localization and positioning – Properties, Approaches, Mathematical basics for single hop and multi-hop environment.

**UNIT IV TRANSPORT LAYER**

Transport Protocol, Coverage and deployments - Sensing models, Coverage measures, Random deployments: Poisson model, Boolean sensing model, general sensing model, Coverage determination, grid deployment, Reliable data transport, Single packet delivery, Block delivery, Congestion control and rate control, Time synchronization – Issues and protocol – Sender/Receiver, Security – protocols and Key Distribution Techniques.

**UNIT V TOOLS FOR WSN**

**TinyOS** – Introduction, NesC, Interfaces, modules, configuration, Programming in TinyOS using NesC, TOSSIM, Contiki – Structure, Communication Stack, Simulation environment – Cooja simulator, Programming.

## REFERENCES:

1. Anna Hac, —Wireless Sensor Network Design, John Wiley & Sons, 2003.
2. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, “Wireless Sensor Networks”, Springer Publication, 2004
3. HolgerKarl , Andreas willig, “Protocol and Architecture for Wireless Sensor Networks”, John Wiley Publication, 2006.
4. KazemSohraby, Daniel Minoli and TaiebZnati, “Wireless Sensor Networks Technology Protocols and Applications”, John Wiley & Sons, 2007.
5. Paolo Santi, “Topology Control in Wireless Adhoc and Sensor Networks”, John Wiley & Sons, 2005.
6. Philip Levis, David Gay, "TinyOS Programming", Cambridge University Press, 2009 Contiki Open Source Operating System for IOT - <http://www.contiki-os.org/>

## WEB REFERENCES

<https://www.geektonight.com/wireless-networks-notes-pdf/>

[https://en.wikipedia.org/wiki/Wireless\\_network](https://en.wikipedia.org/wiki/Wireless_network)

## LEARNINGOUTCOMES

On successful completion of the course students will be able to:

- To be able to design energy efficient WSNs.
- To design and implement protocols in TinyOS and Contiki.
- To design application dependent WSNs.
- To design applications using WSN tools to integrate with IoT

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20



**INTERNET OF THINGS****LEARNING OBJECTIVES**

- To introduce the IoT and its baseline technologies.
- To explore the IOT and M2M and its Connectivity technologies.
- To understand the contribution of WSN and other networks towards IOT.
- To implement the IOT applications using Arduino and Raspberry Pi.
- To know the importance of SDN, Sensor cloud and Fog computing.

**UNIT – I: INTRODUCTION TO INTERNET OF THINGS**

Definition & Characteristics of IoT , Applications of IOT, IOT categories, enablers and connectivity layers, Baseline technologies, Sensors, Actuators, IOT components and implementation, Challenges for IOT; Physical Design of IoT - Things in IoT , IoT Protocols; Logical Design of IoT -IoT Functional Blocks, IoT Communication Models, IoT Communication APIs;IoT Enabling Technologies.

**UNIT - II: IOT NETWORKING & CONNECTIVITY TECHNOLOGIES**

IOT Networking : Connectivity terminologies – Gateway allotment- IOT identification and data protocols ; **Connectivity Technologies**

**UNIT - III: WIRELESS SENSOR NETWORKS** **Wireless Sensor Network (WSN):** Components of Sensor Node, Modes of Detection and Challenges, Sensor web, Behavior of nodes in WSN, Applications of WSN.

**UNIT - IV: IOT PLATFORMS DESIGN METHODOLOGY AND IOT PHYSICAL DEVICES & IMPLEMENTATION**

IoT Design Methodology-steps - Case Study on needs and implementation of IoT Smart Applications - Introduction to Arduino Board and Types of Arduino Boards. Introduction to Arduino IDE, Architecture of Arduino Board, Programming Arduino Board and Running the coding in **Arduino Board** – Implementing the IoT Projects.

**UNIT – V: SOFTWARE DEFINED NETWORK AND SENSOR CLOUD**

**SDN:** Introduction – Architecture of SDN, Rule placement, Openflow protocol, Controller, SDN in IOT- Software defined WSN – SDN for mobile networking and Access Devices; Sensor Cloud: Architecture, Life cycle, layered structure and Applications- Issues and challenges in Sensor Cloud.

**TEXT BOOKS**

1. Jeeva Jose, “Internet of Things”, Kanna publishing, 2018.
2. Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands-on Approach)”, 1<sup>st</sup>Edition, VPT, 2014.

**REFERENCES**

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1<sup>st</sup> Edition, Apress Publications, 2013
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

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<https://thingspeak.com/>  
<https://yourstory.com/2015/03/internet-of-things-application/>  
<https://create.arduino.cc/iot/>  
<https://www.carriots.com/tutorials>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Able to understand the basics of IoT and its baseline technologies.
- Recognize about IOT and M2M and its Connectivity technologies.
- Be familiar with the WSN and other networks in IOT.
- Capable of developing the simple IOT applications using Arduino and Raspberry Pi.
- Make out the importance of SDN, Sensor cloud and Fog computing.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
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C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ARTIFICIAL INTELLIGENCE****LEARNING OBJECTIVES**

- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning
- To introduce the concept of expert systems
- To impart knowledge about neural networks

**UNIT – I: OVERVIEW OF ARTIFICIAL INTELLIGENCE**

Introduction- Definition- Why AI- Difference between symbolic and non-symbolic representation- History of AI- Turing Test- Chinese Room Test- Applications- Objectives of AI- Artificial Intelligence Programming- Criticism of AI- Future of AI..

**UNIT – II: KNOWLEDGE REPRESENTATION AND REASONING SYSTEMS**

**Knowledge Engineering**- Procedure for Knowledge Acquisition- **Knowledge Representation**-Logical- Procedural- Network- Structured- Reasoning- KRR Systems- KR languages- Domain Modelling- Semantic Nets- Frame Based Systems- Hybrid Representation Systems.

**UNIT – III: UNCERTAINTY**

Uncertainty: Non-monotonic and monotonic reasoning- confidence factor- Bayes theorem- Bayesian Networks-Fuzzy Logic- Computer vision- NLP- Speech Recognition.

**UNIT – IV: EXPERT SYSTEMS**

Introduction- Skill vs Knowledge- Characteristics of expert system- history- knowledge engineering- inferencing- Expert system-tools- Applications.

**UNIT – V: NEURAL NETWORKS**

Difference between human and machine intelligence- features of biological neural networks- human brain learns- human neurons to artificial neurons- neural networks learn- learning algorithms- network architectures and their applications- comparisons of neural networks- rule-based methods-expert systems- benefits of neural network-limitations.

**TEXT BOOK**

1. RajendraAkerkar, “Introduction to Artificial Intelligence”, Prentice Hall of India, 2008.

**REFERENCES**

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

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<https://learn.saylor.org/course/view.php?id=96>  
<https://in.udacity.com/course/intro-to-artificial-intelligence--cs271>

**LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
- Apply these techniques in applications which involve perception, reasoning and learning.
- Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.

- Acquire the knowledge of real world Knowledge representation.
- Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
- Use different machine learning techniques to design AI machine and enveloping applications for real world problems

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

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B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**DESIGN AND ANALYSIS OF ALGORITHMS****LEARNING OBJECTIVES**

- To prove the correctness and analyze the running time of the basic algorithms for those classic problems.
- To understand the basic knowledge of algorithm design and its implementation.
- To learn the key techniques of Divide-and-Conquer and Greedy Method.
- To recognize the concept of Dynamic Programming and its algorithms
- To familiarize with Backtracking algorithms.
- To understand Branch and Bound techniques for designing and analyzing algorithms.

**UNIT - I: INTRODUCTION**

Algorithm Specification-Performance Analysis: Space complexity- Time Complexity-Asymptotic notations-practical complexities-performance measurement- Randomized algorithms: An informal Description- Identifying the repeated element- Primality testing- Advantages and Disadvantages.

**UNIT - II: DIVIDE-AND-CONQUER AND GREEDY METHOD**

**Divide-and-conquer**: General method-Binary Search-Finding the maximum and minimum-Merge sort-quick sort- Strassen's Matrix multiplication- The **greedy Method**: The general method-Knapsack problem-Minimum cost spanning tree

**UNIT - III: DYNAMIC PROGRAMMING**

**Dynamic Programming**: Dynamic programming- All pairs shortest paths- Single source shortest paths-String editing- 0/1 knapsack- The traveling salesperson problem-Flow shop scheduling

**UNIT - IV: BACKTRACKING**

**Backtracking**: General Method-8 queen's problem- Sum of subsets- Graph coloring-Hamiltonian cycles-Knapsack Problem

**UNIT - V: BRANCH AND BOUND**

**Branch-and-Bound**: General method of algebraic problem-Modular arithmetic- Comparison trees-Lower bound through reduction-Planar graph coloring problem-Bin packing.

**TEXT BOOK**

1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt.Ltd, 2005

**REFERENCES**

1. S.K.Basu, "Design Methods and Analysis of Algorithms", Fourth edition, 2010
2. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, Addison-Wesley Publishing Company, 2003
3. AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, Dorling Kindersley India Pvt.Ltd, 2003

**WEB REFERENCES**

<http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html>  
<http://cs.uef.fi/pages/franti/asa/notes.html>  
<http://computerstuff7090.blogspot.in/2012/11/design-analysis-and-algorithm-video.html>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems.
- Understand the basic knowledge of algorithm design and its implementation.
- Learn the key techniques of Divide-and-Conquer and Greedy Method.
- Recognize the concept of Dynamic Programming and its algorithms
- Familiarize with Backtracking algorithms.
- Understand Branch and Bound techniques for designing and analyzing algorithms.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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B	<b>EITHER OR TYPE</b>	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**MOBILE APPLICATIONS****LEARNING OBJECTIVES**

- To know the basis of Android application and development environment
- To able to develop simple and professional application
- To know the different controls in Android
- To impart knowledge about handling pictures and menus
- To get ready for the job opportunity in mobile application development

**UNIT - I: INTRODUCTION TO ANDROID**

History of Android Platform- Android APIs- Android Architecture Application Framework- Features of Android- Android Applications- Application Components - Manifest File- Downloading and Installing Android and Android SDK - Setting up Android Virtual and physical Device - Exploring the Development Environment - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools- Developing and Executing the First Android Application - Using Eclipse IDE to Create an Application - Running Your Application - Exploring the Application - Using Command - Line Tools.

**UNIT – II: ACTIVITIES, INTENTS AND FRAGMENTS**

Working with **Activities**- Creating an Activity- Starting an Activity – Managing the Life cycle of an Activity - Applying Themes and Styles to an Activity- Displaying a Dialog in the Activity - Hiding the title of the activity- **Using Intents**-Exploring Intent Objects- Exploring Intent Resolution- Exploring Intent Filters - Resolving Intent Filter Collision - Linking the Activities Using Intent - Obtaining Results from Intent – Passing Data Using an Intent Object- Fragments - Hiding Title Bar and Screen Orientation - Fragment Implementation - Finding Fragments - Adding, Removing and Replacing Fragments - Finding Activity Using Fragment - Using the Intent Object to Invoke Built-in Application..

**UNIT - III: UI USING VIEWS AND VIEW - GROUPS**

Working with **View Groups** – Linear Layout – Relative Layout – Scroll Layout – Table Layout – Frame Layout – Tab Layout using the Action Bar – Working with Views – Text – Edit Text – Button – Radio Button – Check Box – Image Button – Toggle Button – Rating Bar – Binding Data with Adapter View Class – List View – Spinner – Gallery – Designing the Auto Text Complete View – Screen Orientation – Anchoring the Views of Current Activity – Handling UI Events – Handling User Interaction with Activities and Views – Specialized Fragments – List Fragment – Dialog Fragment – Preference Fragment – Creating Menus, Option Menus, Context Menu and Sub Menu.

**UNIT - IV: HANDLING PICTURES AND MENUS WITH VIEWS AND STROING THE DATA**

Working with Image Views – Displaying Images in the Gallery View – Displaying Images in the Grid View – Using the Image Switcher View- Designing Context Menu for Image View- Using the Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity - Notifying the User Creating the Toast Notification - Creating the Status Bar Notification- Creating the Dialog Notification - Introducing the Data Storage Options - Using Preferences - Using the SQLite Database Creating the Database - Executing the Database Operations.

**UNIT - V: EMAILING, TELEPHONY AND SMS IN ANDROID**

Building an Application to Send Email - Handling Telephony - Displaying Phone InformationApplication Receiving Phone Calls – Making Outgoing Phone Calls Application - Handling SMS Sending SMS Using SMS Manager - Sending SMS Using Intent - Receiving SMS Using the Broadcast Receiver Object- Role of Default SMS Providers - . Publishing Android Application: Export android application – Google play store registration.

Supplementary Learning: Building Mobile Applications using Xamarin

## TEXT BOOKS

1. Pradeep Kothari, “Android Application Development (with kitkat support) Black Book”, Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications.
2. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, “Pro Android 2”, 2010 Edition, Wiley publications.

## REFERENCES

1. Reto Meier ,”Professional Android Application Development”,2009 Edition, Willy Publication.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, “Programming Android”, OReilly publications.

## WEB REFERENCES

www.tutorialspoint.com  
www.javatpoint.net  
www.mkyong.com  
www.java2s.com

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Know about the mobile application development environment
- Develop interface and design
- Use the techniques in Mobile Applications
- Develop a simple as well as a professional application
- Be ready for the job opportunity in mobile application development

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
			Unit I	Unit II	Unit III	Unit IV	Unit V	
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C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20



**ELECTIVE - III: A. SEMANTIC WEB AND APPLICATIONS****COURSE OBJECTIVES:**

- To learn the fundamentals of semantic web and to conceptualize and depict ontology for semantic web.
- To make a study of languages for semantic web.
- To learn about the ontology learning algorithms and to utilize in the development of an application.
- To know the fundamental concepts of ontology management.
- To learn the applications related to semantic web.

**UNIT I THE QUEST FOR SEMANTICS**

Building Models – Calculating with Knowledge – Exchanging Information – Semantic Web Technologies – Layers – Architecture – Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background – Sample Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – **Domain Ontologies – Semantic Web** – Need – Foundation.

**UNIT II LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES 9**

Web Documents in XML – **RDF** – Schema – Web Resource Description using RDF – RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics – Traditional Ontology Languages – LOOM – OKBC – OCML – FLogic Ontology Markup Languages – SHOE – OIL – DAML + OIL – **OWL**.

**UNIT III ONTOLOGY LEARNING FOR SEMANTIC WEB**

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms – Methods for Evaluating Ontologies.

**UNIT IV ONTOLOGY MANAGEMENT AND TOOLS**

Overview – Need for Management – Development Process – Target Ontology – Ontology Mapping – Skills Management System – Ontological Class – Constraints – Issues, Evolution – Development Of Tools And Tool Suites – **Ontology Merge Tools – Ontology Based Annotation Tools**.

**UNIT V APPLICATIONS**

Web Services – **Semantic Web Services** – Case Study for Specific Domain – Security Issues – Web Data Exchange and Syndication - Semantic Wikis – Semantic Portals – Semantic Metadata in Data Formats – Semantic Web in Life Sciences – Ontologies for Standardizations – Rule Interchange Format.

**REFERENCES:**

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, “Foundations of Semantic Web Technologies”, Chapman & Hall/CRC, 2009.
2. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez “Ontological Engineering: with Examples from the Areas of Knowledge Management, E-Commerce and the Semantic Web”, Springer, 2004.
3. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer (Cooperative Information Systems)”, The MIT Press, 2004.
4. Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer, 2002.
5. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley, 2003.
6. John Davies, Rudi Studer, Paul Warren, “Semantic Web Technologies: Trends and Research in Ontology-based Systems”, Wiley, 2006.

## WEB REFERENCES

### LEARNING OUTCOMES:

On successful completion of the course students will be able to:

- Create ontology for a given domain.
- Develop an application using ontology languages and tools.
- Understand the concepts of semantic web.
- Use ontology related tools and technologies for application creation.
- Design and develop applications using semantic web.
- Understand the standards related to semantic web.

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – III: B. ETHICAL HACKING & CYBER FORENSICS****COURSE OBJECTIVES**

- To understand the hacking techniques of computer forensics.
- To learn about data recovery methods.
- To know about threats and vulnerabilities
- To identify the threats in computer forensics.
- To get knowledge on data recovery

**UNIT I ETHICAL HACKING**

Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications.

**UNIT II TYPES OF COMPUTER FORENSICS**

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

**UNIT III DATA RECOVERY**

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

**UNIT IV ELECTRONIC EVIDENCE**

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

**UNIT V THREATS**

Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

**REFERENCE BOOKS:**

1. John R. Vacca, “Computer Forensics”, Firewall Media, 2004.
2. Kevin Beaver, “Hacking For Dummies”, John Wiley & Sons, 2012.
3. Chad Steel, “Windows Forensics”, Wiley India, 2006.
4. Majid Yar, “Cybercrime and Society”, Sage Publications, 2006.
5. Robert M Slade, “Software Forensics”, Tata McGrawHill, 2004.

**WEB REFERENCES**

<https://tell.colvee.org/course/view.php?id=14>

**LEARNING OUTCOMES**

On successful completion of the course students will be able to:

- Able to distinguish between hackers and normal users.
- To apply the principles of computer forensics for security.
- To implement the data recovery methods.
- To manage threats and the tactics.

**BLUE PRINT OF THE SEMESTER QUESTION PAPER**

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C	<b>ANY THREE</b>	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – III: C. CLOUD COMPUTING****LEARNING OBJECTIVES**

- To introduce the broad perceptive of cloud architecture and model.
- To understand the concept of Virtualization and design of cloud Services
- To be familiar with the lead players in cloud.
- To understand the features of cloud simulator
- To apply different cloud programming model as per need.
- To learn to design the trusted cloud Computing system

**UNIT - I:INTRODUCTION TO CLOUD COMPUTING**

Introduction - Characteristics - Cloud Models - Cloud Services Examples-Cloud Based Services & Applications - Cloud concepts and Technologies – Virtualization – types - Pros and Cons.

**UNIT - II: CLOUD SERVICES AND PLATFORMS**

Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software-Virtualization- Characteristics- taxonomy-types- Pros and Cons.

**UNIT – III: CLOUD APPLICATION DESIGN AND DEVELOPMENT**

Design considerations for cloud applications- Reference Architecture for Cloud Applications- Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches.

**UNIT – IV: MULTIMEDIA CLOUD, APPLICATION BENCHMARKING & TUNING**

Introduction- streaming protocols- Cloud Application Benchmarking and Tuning: Introduction- workload characteristics- application performance metrics- Benchmarking methodology and tools- deployment prototyping.

**UNIT – V: CLOUD SECURITY AND APPLICATIONS**

Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Healthcare- Energy Systems- Transportation Systems- Manufacturing Industry- Education.

**TEXT BOOKS**

1. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.
2. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.

**REFERENCES**

1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2. Michael Miller “Cloud Computing Web based application that change the way you work and collaborate online”. Pearson edition, 2008.
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Learning, 2012.

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[www.javatpoint.com/cloud-computing-tutorial](http://www.javatpoint.com/cloud-computing-tutorial)

<https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html>

[https://www.siteground.com/tutorials/cloud/cloud\\_computing.htm](https://www.siteground.com/tutorials/cloud/cloud_computing.htm)

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- To know the broad perceptive of cloud architecture and model.
- Familiar with Virtualization and design of cloud Services
- understand the features of cloud services
- To apply different cloud programming model as per need.
- To design the trusted cloud Computing system

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
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A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**BIG DATA ANALYTICS****LEARNING OBJECTIVES**

- To understand the needs for Big Data and its environments.
- To learn the basic requirements of Big Data Technologies.
- To expose the knowledge of MapReduce programming framework (Hadoop).
- To be familiar with withNoSQL DB's Cassandra and MongoDB
- To understand Hive and Pig technologies for analyzing the Big Data.

**UNIT - I: TYPES OF DIGITAL DATA AND BIG DATA**

Classification of Digital Data - Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - Big Data Definition - Other Characteristics of Data Definitional Traits of Big Data – Need of Big Data - Information Consumer vs Produce Information -Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - A Typical Hadoop Environment.

**UNIT - II: BIG DATA ANALYTICS AND TECHNOLOGY LANDSCAPE**

Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Data Science - Data Scientist - Terminologies Used in Big Data Environments- Basically Available Soft State Eventual Consistency (BASE) - Few Top Analytics Tools; NoSQL (Not OnlySQL).

**UNIT - III: HADOOP AND MAPREDUCE PROGRAMMING**

Introducing Hadoop - RDBMS versus Hadoop - Distributed Computing Challenges - History of Hadoop - Hadoop Overview - Use Case of Hadoop - Hadoop Distributors - HDFS (Hadoop Distributed File System) - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator) - Interacting with Hadoop Ecosystem - Mapper - Reducer - Combiner - Partitioner.

**UNIT - IV: MONGODB AND CASSANDRA**

Terms Used in RDBMS and MongoDB - Data Types in MongoDB - MongoDB Query Language; Introduction to Cassandra - Apache Cassandra - An Introduction - Features of Cassandra - CQL Data Types - CQLSH - Keyspaces - CRUD (Create, Read, Update and Delete) Operations - Collections - Using a Counter - Time to Live (TTL) - Alter Commands Import and Export – Querying System Tables.

**UNIT - V: HIVE AND PIG**

Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language (HQL) - RCFile Implementation - SerDe - User-Defined Function (UDF) ; The Anatomy of Pig - Pig on Hadoop - Data Types in Pig - Running Pig - Execution Modes of Pig - Relational Operators - Pig versus Hive.

**TEXT BOOK**

1. SeemaAcharya and SubhashiniChellappan, “Big Data and Analytics”, Wiley Publication.

**REFERENCES**

1. SoumendraMohanty, MadhuJagadeesh, and HarshaSrivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, Apress Publication. ‘Bid Data Now 2012 Edition’, O’Reilly, First Edition, 2012
2. Paul Zikopoulos, Thomas Deutsch, Dirk Deroos, David Corrigan, Krishnan Parasuraman and James Giles, “Harness the power of Big Data”, McGrawHill, 2013

**WEB REFERENCES****Online Tutorial**

<http://strata.oreilly.com/2010/09/the-smaq-stack-for-big-data.html>

[http://blogs.computerworld.com/18840/big\\_data\\_smaq\\_down\\_storage\\_mapreduce\\_and\\_query](http://blogs.computerworld.com/18840/big_data_smaq_down_storage_mapreduce_and_query)

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Learn about types of digital data and big data
- Gain knowledge of various Big data analytics and its Technologies
- Study about various NoSQL databases and management techniques
- Work with NoSQL databases such as MongoDB and Cassandra
- Design Big data queries using Hive and Pig.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20



**DATA SCIENCE WITH PYTHON****LEARNING OBJECTIVES**

- To know the fundamental algorithmic ideas to process data.
- To learn to apply hypotheses and data into actionable predictions.
- To document and transfer the results and effectively communicate the findings using visualization techniques.
- To employ the Map reduce technique

**UNIT – I: INTRODUCTION TO DATA SCIENCE**

**Python for Data Analysis** - Essential Python Libraries – Installation and setup python basics: The python Interpreter- Ipython Basics- Data Structure and Sequences: Tuple – list.

**UNIT - II: NUMPY AND UNIVERSAL FUNCTIONS**

**NumPy Basics:** Arrays and Vectorized Computation -The NumPyndarray: A Multidimensional Array Object - **Universal Functions:** Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - Random Number Generation.

**UNIT - III: PANDAS**

Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics - Handling Missing Data -Hierarchical Indexing - Other pandas Topics.

**UNIT - IV: DATA LOADING, STORAGE, AND FILE FORMATS**

Reading and Writing Data in Text Format - Binary Data Formats - Interacting with HTML and Web APIs - Interacting with Databases - Data Wrangling: Clean, Transform, Merge, Reshape.

**UNIT - V: PLOTTING AND VISUALIZATION**

Plotting and Visualization: A Brief matplotlib API Primer - Plotting Functions in pandas -Python Visualization Tool Ecosystem - Time Series.

**TEXT BOOKS**

1. Wes McKinney, “Python for Data Analysis”, Published by O’Reilly Media, 2012.
2. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly Media Publishers, 2016.
3. Curtis Miller, “Hands-On Data Analysis with NumPy and Pandas”, Packt Publications, June 2018.

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1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley, 2011.
5. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
6. 1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>) 2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python - Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.<http://www.network-theory.co.uk/docs/pytut/>

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<http://bigdatauniversity.com/>  
<http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>

<https://www.datacamp.com/>  
<https://www.dataquest.io/>

### LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Preparing and pre-processing data
- Visualizing the results of analytics effectively
- Basic understanding of NumPy and Pandas
- Ability to use conditional loops and list by python
- Learn the Visualization through Matplotlib

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

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B	<b>EITHER OR TYPE</b>	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	<b>ANY THREE</b>	15	Theory	Theory or Program	Program	Program	Theory or Program	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**MACHINE LEARNING****LEARNING OBJECTIVES**

To introduce the concepts like

- conceptualization and summarization of big data and machine learning
- Introduction to the course, recap of linear algebra and probability theory basics.
- Bayesian Classification: Naive Bayes, Parameter Estimation (ML, MAP), Sequential Pattern Classification.
- Non-parametric Methods: k-Nearest Neighbours
- Discriminative Learning models: Logistic Regression, Perceptrons, Artificial Neural Networks, Support Vector Machines.

**UNIT – I: INTRODUCTION TO MACHINE LEARNING**

Learning Systems- Goals and Applications- Aspects of developing a learning system- Training data- Linear Perceptrons as Neurons- Neural Nets- Working- Layers- Activation Functions- Feed Forward Neural Networks- Limitations- DBNs- Deep learning for Bigdata- Local minima- rearranging neurons- Spurious local minima- Comparison of AI- Machine learning & Deep learning.

**UNIT – II: TYPES OF LEARNING**

Supervised Learning- Unsupervised Learning- Case Study- Classification- MLP in Practice- Overfitting- Linear and non-linear discriminative- **decision trees**- Probabilistic- K-nearest neighbor learning algorithm- curse of dimensionality.

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**UNIT – III: LEARNING ALGORITHMS**

Logistic Regression- Perceptron- Exponential Family- Generative Learning algorithms- Gaussian Discriminant Analysis- Naïve Bayes- SVM-Kernels- Model Selection- Bagging- Boosting- Evaluating and debugging- Classification errors.

**UNIT – IV: UNSUPERVISED AND LEARNING ALGORITHMS**

Clustering- K-means Clustering- EM algorithm- Mixture of Gaussians- Factor Analysis- Principal and Independent Component Analysis- latent Semantic Indexing- Spectral or sub-space clustering.

**UNIT – V: REINFORCEMENT LEARNING, IOT AND MACHINE LEARNING**

Markov Decision Processes- Bellman Equations- Value Iteration and Policy Iteration- Linear quadratic regulation- LQG Q-Learning- Policy versus value learning- POMDPS- IoT- Recent trends- various models. Case Study: Object Detection and smudging using gradient Descent, Spam Filtering based on Text Classification.

**TEXT BOOKS**

1. Rajiv Chopra, "Machine Learning", Khanna Publications, New Delhi, 2018.
2. V.K. Jain, "Machine Learning", Khanna Publications, New Delhi, 2018.

**REFERENCES**

1. Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 2013.
2. Pattern Classification, 2nd Ed., Richard Duda, Peter Hart, David Stork, John Wiley & Sons, 2001.
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer 2006.

**WEB REFERENCES**

<https://www.datacamp.com/courses/introduction-to-machine-learning-with-r>  
<https://elitedatascience.com/learn-machine-learning>  
<https://www.analyticsvidhya.com/learning-path-learn-machine-learning/>

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- design and implement machine learning solutions to classification, regression, and clustering problems;
- evaluate and interpret the results of the algorithms.
- Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
- Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
- Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
- Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – IV: A. CRYPTOGRAPHY AND NETWORK SECURITY****LEARNING OBJECTIVES**

- To introduce Classical Encryption techniques
- To understand the principles of encryption algorithms
- To have a detailed knowledge about authentication, hash functions and application level security mechanisms.
- To introduce Network Security Concepts
- To understand the System level Security

**UNIT – I: INTRODUCTION**

Need for Security – Approaches- Principles- Types of Attacks- **Cryptography Techniques**: Plain text and Cipher Text – Substitution- Transposition- Encryption and Decryption- Symmetric and Asymmetric Key Cryptography- Steganography- possible attacks.

**UNIT - II: SYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS**

Algorithm Types and Modes - Overview of Symmetric – Key Cryptography – Data Encryption Standard – International Data Encryption Algorithm (IDEA) – RC4 – RC5- Blowfish – **Advanced Encryption Standard (AES)**. Case Study: Diffie Hellman Key Exchange

**UNIT - III: ASYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS**

Introduction and Overview of Asymmetric-Key Cryptography – **RSA Algorithm** – ElGamal Cryptography – Symmetric – and Asymmetric- Key Cryptography – Digital Signatures – Knapsack Algorithm – Attack on Digital Signatures – Problems with the Public-Key Exchange.

**UNIT - IV: INTERNET-SECURITY PROTOCOLS**

Basic concepts of IS Protocols – Secure Socket Layer – Transport Layer Security – Secure Hyper Text Transfer Protocol – Secure Electronic Transaction -Email Security – **Wireless Application Protocol Security**.

**UNIT – V: NETWORK SECURITY, FIREWALLS AND VPN**

Introduction – Brief introduction to TCP/IP- Firewalls- types of firewalls- Firewall Configurations- Limitations of Firewall- IP Security- **Virtual Private Networks**- Intrusion: Intruders- Audit Records- **Intrusion Detection**- Distributed Intrusion Detection- Honeypots.

**TEXT BOOKS**

1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2017.
2. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, Sixth Edition, 2014.
3. Behrouz A Forouzan, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2018.

**REFERENCES**

1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

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[www.tutorialspoint.com/cryptography/](http://www.tutorialspoint.com/cryptography/)  
[www.iitg.ac.in/icdcn2006/isg.pdf](http://www.iitg.ac.in/icdcn2006/isg.pdf)  
[williamstallings.com/Cryptography/](http://williamstallings.com/Cryptography/)

## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Provide security of the data over the network.
- Do research in the emerging areas of cryptography and network security.
- Implement various networking protocols.
- Protect any network from the threats in the world.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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C	ANY THREE	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20

**ELECTIVE – IV: B. SOCIAL NETWORK ANALYSIS****COURSE OBJECTIVES:**

- To gain knowledge about the current web development and emergence of social web.
- To study about the modeling, aggregating and knowledge representation of semantic web.
- To appreciate the use of machine learning approaches for web content mining.
- To learn about the extraction and mining tools for social networks.
- To gain knowledge on web personalization and web visualization of social networks.

**UNIT I CLUSTERING AND CLASSIFICATION**

**Supervised Learning** – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers – Unsupervised Learning – K-means Clustering – Hierarchical Clustering – Partially Supervised Learning – Markov Models – Probability-Based Clustering – Vector Space Model

**UNIT II SOCIAL MEDIA MINING**

Data Mining Essentials – Data Mining Algorithms - **Web Content Mining – Latent semantic Indexing** – Automatic Topic Extraction – Opinion Mining and Sentiment Analysis – Document Sentiment Classification

**UNIT III EXTRACTION & MINING COMMUNITIES IN WEB SOCIAL NETWORKS**

Extracting evolution of Web Community from a Series of Web Archive – Detecting Communities in Social Networks – Definition of Community – Evaluating Communities – Methods for Community Detection & Mining – Applications of Community Mining Algorithms – Tools for Detecting Communities – Social Network Infrastructure and Communities – **Decentralized Online Social Networks** – Multi-Relational Characterization of Dynamic Social Network Communities

**UNIT IV HUMAN BEHAVIOR ANALYSIS AND PRIVACY ISSUES 9+6**

Understanding and Predicting Human Behavior for Social Communities – User Data Management, Inference and Distribution – Enabling New Human Experiences – **Reality Mining** – Context-Awareness – Privacy in Online Social Networks – Trust in Online Environment – Trust Models Based on Subjective Logic – Trust Network Analysis – Trust Transitivity Analysis – Combining Trust and Reputation – Trust Derivation Based on Trust Comparisons – Attack Spectrum and Countermeasures

**UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS**

Graph Theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing Online Social Networks – Visualizing Social Networks with Matrix-Based Representations – Node-Link Diagrams – Hybrid Representations – Applications – Covert Networks – Community Welfare – Collaboration Networks – Co-Citation Networks – Recommendation in Social Media: Challenges – Classical Recommendation Algorithms – Recommendation Using Social Context – Evaluating Recommendations

**REFERENCES:**

1. Peter Mika, "Social networks and the Semantic Web", Springer, 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 2010.
3. Bing Liu, "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-Centric Systems and Applications)", Springer; Second Edition, 2011.
4. Reza Zafarani, Mohammad Ali Abbasi, Huan Liu, "Social Media Mining", Cambridge University Press, 2014.
5. Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking Techniques and applications", Springer, 2011.
6. Dion Goh and Schubert Foo, "Social information retrieval systems: emerging technologies and Applications for searching the Web effectively", Idea Group, 2007.

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## LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Apply knowledge of current web development in the era of social web.
- Model, aggregate and represent knowledge for semantic web.
- Use machine learning approaches for web content mining.
- Design extraction and mining tools for social networks.
- Develop personalized web sites and visualization for social networks.

## BLUE PRINT OF THE SEMESTER QUESTION PAPER

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C	<b>ANY THREE</b>	15	1	1	1	1	1	5
<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20



**ELECTIVE – IV: C.SOFT COMPUTING****LEARNING OBJECTIVES**

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques to solve problems.
- To introduce fuzzy systems and its applications
- To impart knowledge on developing hybrid systems

**UNIT- I: INTRODUCTION TO SOFT COMPUTING**

Introduction-**Artificial Intelligence**-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

**UNIT – II: ARTIFICIAL NEURAL NETWORKS**

Back propagation Neural Networks – Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines – **Spike Neuron Models**.

**UNIT- III: FUZZY SYSTEMS**

Introduction to **Fuzzy Logic**, Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations - Membership Functions -**Defuzzification** – Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning – Introduction to Fuzzy Decision Making.

**UNIT – IV: GENETIC ALGORITHMS**

Basic Concepts- Working Principles -Encoding- Fitness Function – Reproduction -Inheritance Operators – Cross Over – Inversion and Deletion -Mutation Operator – Bit-wise Operators -Convergence of Genetic Algorithm.

**UNIT – V: HYBRID SYSTEMS**

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination – LR-Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP- Inference by Fuzzy BP – **Fuzzy ArtMap**: A Brief Introduction – Soft Computing Tools – GA in Fuzzy Logic Controller Design – Fuzzy Logic Controller

**TEXT BOOKS:**

1. N.P.Padhy, S.P.Simon, “Soft Computing with MATLAB Programming”, Oxford University Press, 2015.
2. S.N.Sivanandam ,S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt. Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.VijayalakshmiPai, “Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications “, PHI Learning Pvt. Ltd., 2017.

**REFERENCES:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2002.
2. KwangH.Lee, —First course on Fuzzy Theory and Applications, Springer, 2005.
3. George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall, 1996.

4. James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques, Addison Wesley, 2003.

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<https://www.tutorialspoint.com/difference-between-ai-and-soft-computing>

### LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Apply suitable soft computing techniques for various applications.
- Integrate various soft computing techniques for complex problems.
- To analyze and visualize from fuzzy data
- To build a personalized recommender system.

### BLUE PRINT OF THE SEMESTER QUESTION PAPER

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<b>TOTAL NUMBER OF QUESTIONS</b>			4	4	4	4	4	20