

AC- / 21th Sep / 2019

Item No-



**Rayat Shikshan Sanstha's  
KARMAVEER BHURAO PATIL COLLEGE, VASHI.  
NAVI MUMBAI  
(AUTONOMOUS COLLEGE)  
Sector-15- A, Vashi, Navi Mumbai - 400 703**

**Syllabus for T.Y.B.Sc. Information Technology**

**Program: B.Sc. Information Technology**

**Course: T.Y.B.Sc. Information Technology**

**(Choice Based Credit, Grading and Semester System  
with effect from the academic year 2020-2021)**

Rayat Shikshan Sanstha's  
**Karmaveer Bhaurao Patil College Vashi, Navi Mumbai**  
**Autonomous College**  
[University of Mumbai]  
Syllabus for Approval

<b>Sr. No.</b>	<b>Heading</b>	<b>Particulars</b>
<b>1</b>	<b>Title of Course</b>	<b>T.Y.B.Sc. Information Technology</b>
<b>2</b>	<b>Eligibility for Admission</b>	<b>12<sup>th</sup> Maths</b>
<b>3</b>	<b>Passing Marks</b>	<b>40%</b>
<b>4</b>	<b>Ordinances/Regulations (if any)</b>	
<b>5</b>	<b>No. of Years/Semesters</b>	<b>One year/Two semester</b>
<b>6</b>	<b>Level</b>	<b>U.G.</b>
<b>7</b>	<b>Pattern</b>	<b>Semester</b>
<b>8</b>	<b>Status</b>	<b>Revised</b>
<b>9</b>	<b>To be implemented from Academic year</b>	<b>2020-2021</b>

## **Preamble of the Syllabus:**

The B.Sc. Information Technology programme was started in 2001 with an aim to make the students employable and impart industry oriented training. The main objectives of the course are:

- To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
- To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related post graduate programmes.
- To be capable of managing complex IT projects with consideration of the human, financial and environmental factors.
  - To work effectively as a part of a team to achieve a common stated goal.
  - To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
  - To communicate effectively with a range of audiences both technical and non-technical.
  - To develop an aptitude to engage in continuing professional development. The new syllabus is aimed to achieve the objectives. The syllabus spanning three years covers the industry relevant courses. The students will be ready for the jobs available in different fields like:

- Software Development (Programming)
- Website Development
- Mobile app development
- Embedded Systems Development & Programming
- Software Testing
- Networking
- Database Administration
  - System Administration
  - Cyber Law Consultant
- GIS (Geographic Information Systems)
- IT Service Desk
- Security

And many others

The students will also be trained in communication skills and green computing

## **Syllabus for T.Y .B.Sc. Information Technology**

### **Objectives of the Course:**

- To acquaint students with the fundamental of computer hardware and software in information technology
- To develop analytical skills and critical thinking through application of theory knowledge into practical course
- To construct and apply knowledge of programming, and appreciate the relationship between several programming languages and other disciplines
- To enable students to understand IT and its industrial and social context

### **Course Outcome:**

#### **By the end of the course, a student should develop the ability:**

- To understand, coherently and effectively about various basic components of computers.
- To develop the understanding and interest in the field of IT
- To develop basic skills in practical of Information Technology and its industrial applications.

## Scheme of examination for Each Semester:

**Continuous Internal Evaluation: 40 Marks** (Common Test-20 Marks & 20 Marks for- Assignment, Projects, Group discussion, Open book test, online test etc.)

**Semester End Examination: 60 Marks** will be as follows -

<b>I.</b>	<b>Theory:</b> The Semester End Examination for theory course work will be conducted as per the following scheme.	
	Each theory paper shall be of two and half hour duration.	
	All questions are compulsory and will have internal options.	
	Q – I	From Unit – I (having internal options.) 10 M
	Q – II	From Unit – II (having internal options.) 10 M
	Q – III	From Unit – III (having internal options.) 10 M
	Q – IV	From Unit – IV (having internal options.) 10 M
	Q-V	From Unit – V (having internal options.) 10 M
Q-VI	From Unit – VI (having internal options.) 10 M	
<b>II.</b>	<b>Practical</b>	The Semester End Examination for practical course work will be conducted as per the following scheme.
<b>Sr. No.</b>	<b>Particulars of Semester End Practical Examination</b>	<b>Marks%</b>
1	Laboratory Work	40
2	Journal	05
3	Viva	05
	<b>TOTAL</b>	<b>50</b>

### Semester –V

Course Code	Course Type	Course Title 2020-21	Credits
UGIT501	Skill Enhancement Course	Software Quality Assurance	2
UGIT502	Skill Enhancement Course	Computer Networks	2
UGIT503	Skill Enhancement Course	Advanced Web Programming	2
UGIT504	Discipline Specific Elective (Any One)	Internet of Things	2
UGIT505		Artificial Intelligence	
UGIT506	Discipline Specific Elective (Any One)	Enterprise Java	2
UGIT507		Next Generation Technologies	
UGIT5P1	Skill Enhancement Course Practical	Software Quality Assurance Practical	2
UGIT5P2	Skill Enhancement Course Practical	Internet of Things Practical	2
UGIT5P3	Skill Enhancement Course	Advanced Web Programming Practical	2
UGIT5P4	Discipline Specific Elective Practical (Any One)	Artificial Intelligence Practical	2
UGIT5P5		Computer Networking Practical	
UGIT5P6	Discipline Specific Elective Practical (Any One)	Enterprise Java Practical	2
UGIT5P7		Next Generation Technologies Practical	
<b>Total Credit</b>			<b>20</b>

**(All the practical mentioned in the syllabi are compulsory as per the courses chosen)**

### Semester –VI

Course Code	Course Type	Course Title 2020-21	Credits
UGIT601	Skill Enhancement Course	Project	4
UGIT602	Skill Enhancement Course	Security in Computing	2
UGIT603	Skill Enhancement Course	Business Intelligence	2
UGIT604	Discipline Specific Elective (Any One)	Principles of Geographic Information Systems	2
UGIT605		Enterprise Networking	
UGIT606	Discipline Specific Elective (Any One)	IT Service Management	2
UGIT607		Cyber Laws	
UGIT6P2	Skill Enhancement Course Practical	Security in Computing Practical	2
UGIT6P3	Skill Enhancement Course Practical	Business Intelligence Practical	2
UGIT6P4	Discipline Specific Elective Practical (Any One)*	Principles of Geographic Information Systems Practical	2
UGIT6P5		Enterprise Networking Practical	
UGIT6P6	Skill Enhancement Course Practical	Advanced Mobile Programming	2
<b>Total Credit</b>			<b>20</b>

**Semester – V**

<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>	
<b>Course Name: Software Quality Assurance</b>		<b>Course Code: UGIT501</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>2</b>
		<b>Internal</b>	<b>60</b>
		<b>--</b>	<b>40</b>

### Objectives:

The objective of this course is to teach the Software quality assurance helps in finalising the software product or app against business and user necessities. It is very essential to have better test coverage for testing the software app totally and make it sure that it is performing great and as per the specifications.

### Expected Learning Outcomes:

- Develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time
- Student learn systematic approach to the development, operation, maintenance, and retirement of software
- Student learn how to use available resources to develop software, reduce cost of software and how to maintain quality of software
- Methods and tools of testing and maintenance of software's..

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<p><b>Introduction:</b> Historical Perspective of Quality, What is Quality? (Is it a fact or perception?), Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes, Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving Software Tools.</p> <p><b>Software Quality:</b> Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organization Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, Important Aspects of Quality Management.</p>	<b>10</b>
<b>II</b>	<p><b>Fundamentals of testing:</b> Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing,</p>	<b>10</b>



	Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing, Establishing Testing Policy, Methods, Structured Approach to Testing,	
III	<p><b>Defect Management:</b> Categories of Defect, Defect, Error, or Mistake in Software, Developing Test Strategy, Developing Testing Methodologies (Test Plan), Testing Process, Attitude Towards Testing (Common People Issues), Test Methodologies/Approaches, People Challenges in Software Testing, Raising Management Awareness for Testing, Skills Required by Tester,</p> <p>Testing throughout the software life cycle, Software development models, Test levels, Test types, the targets of testing, Maintenance testing</p> <p><b>Unit Testing:</b> Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing, Equivalence Class Testing: Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations. Decision</p>	10
IV	<p><b>Table-Based Testing:</b> Table-Based Testing: Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations, Path Testing: Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations, Data Flow Testing: Define/Use Testing, Slice-Based Testing, Program Slicing Tools.</p> <p><b>Software Verification and Validation :</b> Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis of Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities.</p>	10
V	<p><b>V-Test Model</b> Introduction, V-model for software, Testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities</p> <p><b>Levels of Testing:</b> Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, Critical Path First, Sub System Testing, System Testing, Testing Stages.</p>	10
VI	<p><b>Special Tests:</b> Introduction, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Parallel Testing, Execution Testing, Operations Testing, Compliance Testing, Usability Testing, Decision Table Testing, Documentation Testing, Training testing, Rapid Testing, Control flow graph, Generating tests on the basis of Combinatorial Designs, State Graph, Risk Associated with New Technologies, Process maturity level of Technology, Testing Adequacy of Control in New technology usage,</p>	10

	Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, eBusinessCommerce Testing, Agile Development Testing, Data Warehousing Testing	
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**Books and References:**

<b>Books and References:</b>					
<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Software Testing and Continuous Quality Improvement	William E. Lewis	CRC Press	Third	2016
2	Software Testing: Principles, Techniques and Tools	M. G. Limaye	TMH		2017
3.	Foundations of Software Testing	Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black	Cengage Learning	3rd	
4.	Software Testing: A Craftsman's Approach	Paul C. Jorgenson	CRC Press	4th	2017

<b>B. Sc (Information Technology)</b>		<b>Semester – III</b>	
<b>Course Name: Software Quality Assurance</b>		<b>Course Code: UGIT5P1</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	<b>--</b>	<b>--</b>

**List of Practicals:**

1. Understand The Automation Testing Approach (Theory Concept)
2. INTRODUCTION TO SELENIUM
3. Using Selenium IDE; Write a test suite containing minimum 4 testcases for different formats
4. .Conduct a test suite for any two web sites.
5. Install Selenium server and demonstrate it using a script in Java/PHP Installation of Selenium RC and Eclipse
6. Write and test a program to login a specific web page.
7. Write and test a program to update 10 student records into table into Excel file .
8. Write and test a program to select the number of students who have scored more than 60 in any one subject ( or all subjects )(using java script )
9. Write and test a program to provide total number of objects present / available on the page .
10. Write and test a program to get the number of list items in a list / combo box.
11. Write and test a program to count number of check boxes on the page checked and unchecked count.
12. Load Testing using JMeter, Android Application testing using Appium Tools, Bugzilla Bug tracking tools.
13. Working with Bugzilla (Bug tracking tool)

<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>	
Course Name: <b>Computer Networks</b>		Course Code: <b>UGIT502</b>	
Periods per week (1 Period is 50 minutes)		<b>5</b>	
Credits		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>2</b>
		<b>Internal</b>	<b>60</b>
		<b>--</b>	<b>40</b>

### Objectives:

Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.

2. Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
3. Study Session layer design issues, Transport layer services, and protocols.
4. Gain core knowledge of Network layer routing protocols and IP addressing.
5. Study data link layer concepts, design issues, and protocols.
6. Read the fundamentals and basics of Physical layer, and will apply them in real time applications.

### Expected Learning Outcomes:

Students will able to:

1. Describe the functions of each layer in OSI and TCP/IP model.
2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.
3. Describe the Session layer design issues and Transport layer services.
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.
5. Describe the functions of data link layer and explain the protocols.
6. Explain the types of transmission media with real time applications

Unit	Details	Lectures
<b>I</b>	<p><b>:Introduction:</b> Data communications, networks, network types, Internet history, standards and administration.</p> <p><b>Network Models:</b> Protocol layering, TCP/IP protocol suite, The OSI model.</p> <p><b>Introduction to Physical layer:</b> Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance</p>	<b>10</b>
<b>II</b>	<p><b>Digital and Analog transmission:</b> Digital-to-digital conversion, analog-to-digital conversion, transmission modes, digital-to-analog conversion, analog-to-analog conversion.</p> <p><b>Bandwidth Utilization:</b> Multiplexing and Spectrum Spreading: Multiplexing, Spread Spectrum</p> <p>Transmission media: Guided Media, Unguided Media</p> <p><b>Switching:</b> Introduction, circuit switched networks, packet switching, structure of a switch.</p>	<b>10</b>
<b>III</b>	<p><b>Introduction to the Data Link Layer:</b> Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes.</p> <p><b>Data Link Control:</b> DLC services, data link layer protocols, HDLC, Point-to-point protocol.</p>	<b>10</b>

	<b>Media Access Control:</b> Random access, controlled access, channelization, Wired LANs – Ethernet Protocol, standard ethernet, fast ethernet, gigabit ethernet, 10 gigabit ethernet,	
<b>IV</b>	<b>Wireless LANs:</b> Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks. <b>Connecting devices and Virtual LANs.</b> <b>Introduction to the Network Layer:</b> Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP	<b>10</b>
<b>V</b>	<b>Unicast Routing:</b> Introduction, routing algorithms, unicast routing protocols. <b>Next generation IP:</b> IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6.	<b>10</b>
<b>VI</b>	<b>Introduction to the Transport Layer:</b> Introduction, Transport layer protocols (Simple protocol, Stop-and-wait protocol, Go-Back-n protocol, Selective repeat protocol, Bidirectional protocols), Transport	<b>10</b>

### Books and References:

<b>Books and References:</b>					
<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw Hill	Fifth Edition	2013
2	TCP/IP Protocol Suite	Behrouz A. Forouzan	Tata McGraw Hill	Fourth Edition	2010
3.	Computer Networks Andrew Tanenbaum	Pearson Fifth 2013			

<b>B. Sc (Information Technology)</b>		<b>Semester – III</b>	
<b>Course Name: Computer Networks</b>		<b>Course Code: UGIT5P2</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	<b>--</b>	<b>--</b>

**List of Practicals:**

<p><b>IPv4 Addressing and Subnetting</b></p> <p>a) Given an IP address and network mask, determine other information about the IP address such as:</p> <ul style="list-style-type: none"> <li>• Network address</li> <li>• Network broadcast address</li> <li>• Total number of host bits</li> <li>• Number of hosts</li> </ul> <p>b) Given an IP address and network mask, determine other information about the IP address such as:</p> <ul style="list-style-type: none"> <li>• The subnet address of this subnet</li> <li>• The broadcast address of this subnet</li> <li>• The range of host addresses for this subnet</li> <li>• The maximum number of subnets for this subnet mask</li> <li>• The number of hosts for each subnet</li> <li>• The number of subnet bits</li> <li>• The number of this subnet</li> </ul> <p>Use of ping and tracert / traceroute, ipconfig / ifconfig, route and arp utilities.</p> <p>Configure IP static routing.</p> <p>Configure IP routing using RIP.</p> <p>Configuring Simple OSPF.</p> <p>Configuring DHCP server and client.</p> <p>Create virtual PC based network using virtualization software and virtual NIC.</p> <p>Configuring DNS Server and client.</p> <p>Configuring OSPF with multiple areas.</p> <p>Use of Wireshark to scan and check the packet information of following protocols</p> <ul style="list-style-type: none"> <li>• HTTP</li> <li>• ICMP</li> <li>• TCP</li> <li>• SMTP</li> <li>• POP3</li> </ul>
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<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>	
<b>Course Name: Advanced Web Programming</b>		<b>Course Code: UGIT503</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>60</b>
		<b>Internal</b>	<b>40</b>

**Objectives:**

To explore .NET technologies for designing and developing dynamic, interactive and responsive web applications.

**Expected Learning Outcomes:**

- Student will be able to understand the .NET framework
- Student will be able to develop a proficiency in the C# programming language
- Student can proficiently develop ASP.NET web applications using C#
- Student can develop dynamic website using ASP.NET.
- Student will be able to use ADO.NET for data persistence in a web application
- Student can implement Security mechanism to provide Authentication and Authorisation.
- Student can use AJAX to enhance the look and feel of website.

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<p><b>Introducing .NET:</b>The .NET Framework, C#, VB, and the .NET Languages, The Common Language Runtime, The .NET Class Library.</p> <p><b>The C# Language:</b>C# Language Basics, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods.</p>	<b>10</b>
<b>II</b>	<p><b>Types, Objects, and Namespaces:</b>The Basics About Classes, Building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies, Advanced Class Programming.</p> <p><b>Error Handling, Logging, and Tracing:</b> Avoiding Common Errors, Understanding Exception Handling, Handling Exceptions, Throwing Your Own Exceptions, Using Page Tracing</p> <p><b>Web Form Fundamentals:</b>Writing Code, Using the Code-Behind Class, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application, Introducing Server Controls, Using the Page Class, Using Application Events, Configuring an ASP.NET Application.</p>	<b>10</b>
<b>III</b>	<p><b>Form Controls:</b> Stepping Up to Web Controls, Web Control Classes, List Controls, Table Controls, Web Control Events and AutoPostBack, Validation, Understanding Validation, Using the Validation Controls, Rich Controls, The Calendar, The AdRotator, Pages with Multiple Views, User Controls and Graphics, User Controls, Dynamic Graphics, The Chart Control.</p>	<b>10</b>

	<b>Website Navigation:</b> Site Maps, URL Mapping and Routing, The SiteMapPath Control, The TreeView Control, The Menu Control.	
<b>IV</b>	<p><b>State Management:</b> Understanding the Problem of State, Using ViewState, Transferring Information Between Pages, Using Cookies, Managing Session State, Configuring Session State, Using Application State, Comparing State Management Options.</p> <p><b>Styles, Themes, and Master Pages:</b> Styles, Themes, Master Page Basics, Advanced Master Pages</p> <p><b>XML:</b> XML Explained, The XML Classes, XML Validation, XMLDisplay and Transforms</p>	<b>10</b>
<b>V</b>	<p><b>ADO.NET Fundamentals:</b> Understanding Databases, Configuring Your Database, Understanding SQL Basics, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access.</p> <p><b>Data Binding:</b> Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls</p> <p><b>The Data Controls:</b> The GridView, Formatting the GridView, selecting a GridView Row, Editing with the GridView, Sorting and Paging the GridView, Using GridView Templates, The DetailsView and FormView</p>	<b>10</b>
<b>VI</b>	<p><b>Caching:</b> What is Caching? When to Use Caching? Output Caching, Data Caching and Fragment Caching</p> <p><b>Security Fundamentals:</b> Understanding Security Requirements, Authentication and Authorization, Forms Authentication, Windows Authentication.</p> <p><b>ASP.NET AJAX:</b> Understanding Ajax, Using Partial Refreshes, Using Progress Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.</p>	<b>10</b>

#### Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Beginning ASP.NET 4.5 in C#	Matthew MacDonald	Apress		2012
2.	C# 2015	Anne Bohem and Joel Murach	Murach	Third	2016
3.	Murach's ASP.NET 4.6 Web Programming in C#2015	Mary Delamater and Anne Bohem	SPD	Sixth	2016
4.	ASP.NET 4.0 programming	J. Kanjilal	Tata McGrawHill		2011
5.	Programming ASP.NET	D.Esposito	Microsoft Press (Dreamtech)		2011



6.	Beginning Visual C# 2010	K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner	Wrox (Wiley)		2010
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<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>		
<b>Course Name: Advanced Web Programming</b>		<b>Course Code: UGIT5P3</b>		
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>		
<b>Credits</b>		<b>2</b>		
		<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>		<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
		<b>Internal</b>	<b>--</b>	<b>--</b>

### List of Practical

<b>1.</b>	<b>Working with basic C# and ASP .NET</b>
a.	Create an application that obtains four int values from the user and displays the product.
b.	Create an application to demonstrate string operations.
c.	Create an application that receives the (Student Id, Student Name, Course Name, Date of Birth) info of students. The application should also display the information of all the students once the data entered.
d.	Create an application to demonstrate following operations i. Generate Fibonacci series. ii. Test for prime numbers. iii. Test for vowels. iv. Use of foreach loop with arrays v. Reverse a number and find sum of digits of a number.
<b>2.</b>	<b>Working with Object Oriented C# and ASP .NET</b>
a.	Create simple application to perform following operations i. Finding factorial Value ii. Money Conversion iii. Quadratic Equation iv. Temperature Conversion
b.	Create simple application to demonstrate use of following concepts i. Function Overloading ii. Inheritance (all types) iii. Constructor overloading iv. Interfaces
c.	Create simple application to demonstrate use of following concepts i. Using Delegates and events ii. Exception handling
<b>3.</b>	<b>Working with Web Forms and Controls</b>
a.	Create a simple web page with various server controls to demonstrate setting and use of their properties. (Example : AutoPostBack)
b.	Demonstrate the use of Calendar control to perform following operations. a) Display messages in a calendar control b) Display vacation in a calendar control c) Selected day in a calendar control using style d) Difference between two calendar dates
c.	Demonstrate the use of Treeview control perform following operations. a) Treeview control and datalist b) Treeview operations
<b>4.</b>	<b>Working with Form Controls</b>
a.	Create a Registration form to demonstrate use of various Validation controls.
b.	Create Web Form to demonstrate use of Adrotator Control.
c.	Create Web Form to demonstrate use User Controls.
<b>5.</b>	<b>Working with Navigation, Beautification and Master page.</b>

a.	Create Web Form to demonstrate use of Website Navigation controls and Site Map.
b.	Create a web application to demonstrate use of Master Page with applying Styles and Themes for p
c.	Create a web application to demonstrate various states of ASP.NET Pages.
<b>6.</b>	<b>Working with Database</b>
a.	Create a web application bind data in a multiline textbox by querying in another textbox.
b.	Create a web application to display records by using database.
c.	Demonstrate the use of Datalist link control.
<b>7.</b>	<b>Working with Database</b>
a.	Create a web application to display Databinding using dropdownlist control.
b.	Create a web application for to display the phone no of an author using database.
c.	Create a web application for inserting and deleting record from a database. (Using Execute-Non Qu
<b>8.</b>	<b>Working with data controls</b>
a.	Create a web application to demonstrate various uses and properties of SqlDataSource.
b.	Create a web application to demonstrate data binding using DetailsView and FormView Control.
c.	Create a web application to display Using Disconnected Data Access and Databinding using GridV
<b>9.</b>	<b>Working with GridView control</b>
a.	Create a web application to demonstrate use of GridView control template and GridView hyperlink
b.	Create a web application to demonstrate use of GridView button column and GridView events.
c.	Create a web application to demonstrate GridView paging and Creating own table format using Gri
<b>10.</b>	<b>Working with AJAX and XML</b>
a.	Create a web application to demonstrate reading and writing operation with XML.
b.	Create a web application to demonstrate Form Security and Windows Security with proper Authent
	properties.
c.	Create a web application to demonstrate use of various Ajax controls.
<b>11.</b>	<b>Programs to create and use DLL</b>

<b>B. Sc (Information Technology)</b>		<b>Semester – III</b>	
<b>Course Name: Internet of Things</b>		<b>Course Code: UGIT504</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>60</b>
	<b>Internal</b>	<b>--</b>	<b>40</b>

### Objectives:

The objective of this course to provide an overview on the IoT ecosystem and enabling environment to foster Internet of Things including technology, standards, cross-sectoral policy and regulatory frameworks, and applications deployments.

### Expected Learning Outcomes:

- Student will be able to provide an understanding of the technologies and the standards relating to the Internet of Things
- Student will be able to assess the vision and introduction of IoT.
- Student will be able to understand IoT Market perspective.
- Student will be able to implement Data and Knowledge Management and use of Devices in IoT Technology.
- Student will be able to understand State of the Art - IoT Architecture.
- Student will be able to classify Real World IoT Design Constraints, Industrial Automation in IoT.

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<b>The Internet of Things: An Overview :</b> The Flavour of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?  <b>Design Principles for Connected Devices:</b> Calm and Ambient Technology, Magic as Metaphor, Privacy, Keeping Secrets, Whose Data Is It Anyway? Web Thinking for Connected Devices, Small Pieces, Loosely Joined, First-Class Citizens On The Internet, Graceful Degradation, Affordances.	<b>10</b>
<b>II</b>	<b>Internet Principles:</b> Internet Communications: An Overview, IP, TCP, UDP, IP Addresses, DNS, Static IP Address Assignment, Dynamic IP Address Assignment, IPv6, MAC Addresses, TCP and UDP Ports, An Example: HTTP Ports, Other Common Ports, Application Layer Protocols, HTTP, HTTPS: Encrypted HTTP, Other Application Layer Protocols.  <b>Thinking About Prototyping:</b> Sketching, Familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Changing Embedded Platform, Physical Prototypes and Mass Personalisation, Climbing into the Cloud, Open Source versus Closed Source, Why Closed? Why Open? Mixing Open and Closed Source, Closed Source for Mass Market Projects, Tapping into the Community.	<b>10</b>
<b>III</b>	<b>Prototyping Embedded Devices:</b> Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino, Developing on the Arduino, Some Notes on the Hardware, Openness, Raspberry Pi, Cases and Extension Boards, Developing on the Raspberry Pi, Some Notes on the Hardware, Openness.	<b>10</b>

<b>IV</b>	<p><b>Prototyping the Physical Design:</b> Preparation, Sketch, Iterate, and Explore, Nondigital Methods, Laser Cutting, Choosing a Laser Cutter, Software, Hinges and Joints, 3D Printing, Types of 3D Printing, Software, CNC Milling, Repurposing/Recycling.</p> <p><b>Prototyping Online Components:</b> Getting Started with an API, Mashing Up APIs, Scraping, Legalities, Writing a New API, Clockodillo, Security, Implementing the API, Using Curl to Test, Going Further, Real-Time Reactions, Polling, Comet, Other Protocols, MQ Telemetry Transport, Extensible Messaging and Presence Protocol, Constrained Application Protocol.</p>	<b>10</b>
<b>V</b>	<p><b>Techniques for Writing Embedded Code:</b> Memory Management, Types of Memory, Making the Most of Your RAM, Performance and Battery Life, Libraries, Debugging.</p> <p><b>Business Models:</b>A Short History of Business Models, Space and Time, From Craft to Mass Production, The Long Tail of the Internet, Learning from History, The Business Model Canvas, Who Is the Business Model For? Models, Make Thing, Sell Thing, Subscriptions, Customisation, Be a Key Resource, Provide Infrastructure: Sensor Networks, Take a Percentage, Funding an Internet of Things Startup, Hobby Projects and Open Source, Venture Capital, Government Funding, Crowdfunding, Lean Startups.</p>	<b>10</b>
<b>VI</b>	<p><b>Moving to Manufacture:</b> What Are You Producing? Designing Kits, Designing Printed circuit boards, Software Choices, The Design Process, Manufacturing Printed Circuit Boards, Etching Boards, Milling Boards. Assembly, Testing, Mass-Producing the Case and Other Fixtures, Certification, Costs, Scaling Up Software, Deployment, Correctness and Maintainability, Security, Performance, User Community.</p> <p><b>Ethics:</b> Characterizing the Internet of Things, Privacy, Control, Disrupting Control, Crowdsourcing, Environment, Physical Thing, Electronics, Internet Service, Solutions, The Internet of Things as Part of the Solution, Cautious Optimism, The Open Internet of Things Definition.</p>	<b>10</b>

### Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Designing the Internet of Things	Adrian McEwen, Hakim Cassimally	WILEY	First	2014

2.	Internet of Things – Architecture and Design	Raj Kamal	McGraw Hill	First	2017
3.	Getting Started with the Internet of Things	Cuno Pfister	O'Reilly	Sixth	2018
4.	Getting Started with Raspberry Pi	Matt Richardson and Shawn Wallace	SPD	Third	2016

<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>		
<b>Course Name: Internet of Things Practical</b>		<b>Course Code: UGIT5P4</b>		
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>		
<b>Credits</b>		<b>2</b>		
		<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>		<b>50</b>
	<b>Internal</b>	<b>--</b>		<b>--</b>

**List of Practicals:**

<b>Practical No</b>	<b>Details</b>
<b>0</b>	Starting Raspbian OS, Familiarising with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB.
<b>1</b>	Displaying different LED patterns with Raspberry Pi.
<b>2</b>	Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi
<b>3</b>	Raspberry Pi Based Oscilloscope
<b>4</b>	Controlling Raspberry Pi with WhatsApp.
<b>5</b>	Setting up Wireless Access Point using Raspberry Pi
<b>6</b>	Fingerprint Sensor interfacing with Raspberry Pi
<b>7</b>	Raspberry Pi GPS Module Interfacing
<b>8</b>	IoT based Web Controlled Home Automation using Raspberry Pi
<b>9</b>	Visitor Monitoring with Raspberry Pi and Pi Camera
<b>10</b>	Interfacing Raspberry Pi with RFID.
<b>11</b>	Building Google Assistant with Raspberry Pi.
<b>12</b>	Installing Windows 10 IoT Core on Raspberry Pi

<b>Course Name: Artificial Intelligence</b>		<b>Course Code: UGIT505</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>60</b>
	<b>Internal</b>	<b>--</b>	<b>40</b>

### Objectives:

The main purpose of this course is to provide the most fundamental knowledge to the students so that they can understand what the AI is. Due to limited time, we will try to eliminate theoretic proofs and formal notations as far as possible, so that the students can get the full picture of AI easily. Students who become interested in AI may go on to the graduate school for further study.

### Expected Learning Outcomes:

- Student will able to understand mathematical models such as belief networks and Markov decision processes and apply them to a range of AI problems.
- Student will able to demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Student can apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Student will able to understand and implement search and adversarial (game) algorithms.
- Student can demonstrate proficiency in applying scientific method to models of machine learning.
- Student can demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- Student can demonstrate an ability to share in discussions of AI, its current scope and limitations and societal implications.
- Student can explain the limitations of current Artificial Intelligence techniques.

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<b>Introduction:</b> What is Artificial Intelligence? Foundations of AI, history, the state of art AI today. <b>Intelligent Agents:</b> agents and environment, good behavior, nature of environment, the structure of agents.	<b>10</b>
<b>II</b>	<b>Solving Problems by Searching:</b> Problem solving agents, examples problems, searching for solutions, uninformed search, informed search strategies, heuristic functions.	<b>10</b>
<b>III</b>	<b>Beyond Classical Search:</b> local search algorithms, searching with non-deterministic action, searching with partial observations, online search agents and unknown environments. <b>Adversarial Search:</b> Adversarial Search: Games, optimal decisions in games, alpha-beta pruning, stochastic games, partially observable games, state-of-the-art game programs	<b>10</b>
<b>IV</b>	<b>Logical Agents:</b> Knowledge base agents, The Wumpus world, logic, propositional logic, propositional theorem proving, effective propositional model checking, agents based on propositional logic. <b>First Order Logic:</b> Syntax and semantics, using First Order Logic, Knowledge engineering in First Order Logic.	<b>10</b>

V	<p><b>Inference in First Order Logic:</b>propositional vs. First Order, unification and lifting, forward and backward chaining, resolution.</p> <p><b>Planning:</b>Definition of Classical Planning, Algorithms for planning as state space search, planning graphs, other classical planning approaches, analysis of planning approaches, Time, Schedules and resources, hierarchical planning, Planning and Acting in Nondeterministic Domains, multiagent planning.</p>	10
VI	<p><b>Knowledge Representation:</b>Categories and Objects, events, mental events and objects, reasoning systems for categories, reasoning with default information, Internet shopping world</p>	10

**Books and References:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Artificial Intelligence: A Modern Approach	Stuart Russel and Peter Norvig	Pearson	3rd	2015
2.	A First Course in Artificial Intelligence	Deepak Khemani	TMH	1st	2017
3.	Artificial Intelligence: A Rational Approach	Rahul Deva	Shroff publishers	1st	2018
4.	Artificial Intelligence	Elaine Rich, Kevin Knight and Shivashankar Nair	TMH	3rd	2009
5.	Artificial Intelligence & Soft Computing for Beginners	Anandita Das	SPD	1st	2013

<b>B. Sc (Information Technology)</b>	<b>Semester – V</b>	
Course Name: Artificial Intelligence	Course Code: UGIT5P5	
Periods per week (1 Period is 50 minutes)	3	

<b>Credits</b>			<b>2</b>	
			<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>		<b>2½</b>	<b>50</b>
	<b>Internal</b>		--	--

## List of Practical

Practical No.	Details
1	a. Write a program to implement depth first search algorithm.
	b. Write a program to implement breadth first search algorithm.
2	a. Write a program to simulate 4-Queen / N-Queen problem.
	b. Write a program to solve tower of Hanoi problem.
3	a. Write a program to implement alpha beta search.
	b. Write a program for Hill climbing problem.
4	a. Write a program to implement A* algorithm.
	b. Write a program to implement AO* algorithm.
5	a. Write a program to solve water jug problem.
	b. Design the simulation of tic – tac – toe game using min-max algorithm.
6	a. Write a program to solve Missionaries and Cannibals problem.
	b. Design an application to simulate number puzzle problem.
7	a. Write a program to shuffle Deck of cards.
	b. Solve traveling salesman problem using artificial intelligence technique.
8	a. Solve the block of World problem.
	b. Solve constraint satisfaction problem
9	a. Derive the expressions based on Associative law
	b. Derive the expressions based on Distributive law
10	a. Write a program to derive the predicate. (for e.g.: Sachin is batsman , batsman is cricketer) - > Sachin is Cricketer.
	b. Write a program which contains three predicates: male, female, parent. Make rules for following family relations: father, mother, grandfather, grandmother, brother, sister, uncle, aunt, nephew and niece, cousin.  Question: i. Draw Family Tree. ii. Define: Clauses, Facts, Predicates and Rules with conjunction and



<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>	
<b>Course Name: Enterprise Java</b>		<b>Course Code: USIT506</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>2</b>	<b>60</b>
	<b>Internal</b>	<b>--</b>	<b>40</b>

**Objectives:** The objective of this course is to teach the learner how to use Object Oriented paradigm to develop code and understand the concepts of Enterprise Edition (J2EE).

**Expected Learning Outcomes:**

- Student will be able to implement the Java Servlets
- Student will be able to implement the JDBC (Java Database Connectivity).
- Student will be able to understand, how to implement the RequestDispatcher, COOKIES, Session in the application.
- Student will be able to implement Java Server Pages.
- Student will be able to understand the Concept of Enterprise Beans.
- Student will be able to understand the working and architecture JPA and Hibernate.

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<p><b>Understanding Java EE:</b> What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server</p> <p><b>Java EE Architecture, Server and Containers:</b> Types of System Architecture, Java EE Server, Java EE Containers.</p> <p><b>Introduction to Java Servlets:</b> The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do?</p> <p><b>Servlet API and Lifecycle:</b> Java Servlet API, The Servlet Skeleton, The Servlet Life Cycle, A Simple Welcome Servlet</p> <p><b>Working With Servlets:</b> Getting Started, Using Annotations Instead of Deployment Descriptor.</p>	<b>10</b>
<b>II</b>	<p><b>Working with Databases:</b> What Is JDBC? JDBC Architecture, Accessing Database, The Servlet GUI and Database Example.</p> <p><b>Request Dispatcher:</b> Resquestdispatcher Interface, Methods of Requestdispatcher, Requestdispatcher Application.</p> <p><b>COOKIES:</b> Kinds Of Cookies, Where Cookies Are Used? Creating Cookies Using Servlet, Dynamically Changing The Colors Of A Page</p> <p><b>SESSION:</b> What Are Sessions? Lifecycle Of Http Session, Session Tracking With Servlet API, A Servlet Session Example</p>	<b>10</b>
<b>III</b>	<p><b>Working With Files:</b> Uploading Files, Creating an Upload File Application, Downloading Files, Creating a Download File Application.</p> <p><b>Working With Non-Blocking I/O:</b> Creating a Non-Blocking Read Application, Creating The Web Application, Creating Java Class, Creating Servlets, Retrieving The File, Creating index.jsp</p> <p><b>Introduction To Java Server Pages:</b> Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, How does a JSP function? How does JSP execute? About Java Server Pages</p>	<b>10</b>
<b>IV</b>	<p><b>Getting Started With Java Server Pages:</b> Comments, JSP Document, JSP Elements, JSP GUI Example.</p>	<b>10</b>

	<p><b>Action Elements:</b> Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Loading a Javabean.</p> <p><b>Implicit Objects, Scope And El Expressions:</b> Implicit Objects, Character Quoting Conventions, Unified Expression Language [Unified El], Expression Language.</p> <p><b>Java Server Pages Standard Tag Libraries:</b> What is wrong in using JSP Scriptlet Tags? How JSTL Fixes JSP Scriptlet's Shortcomings? Disadvantages Of JSTL, Tag Libraries.</p>	
V	<p><b>Introduction To Enterprise Javabeans:</b> Enterprise Bean Architecture, Benefits of Enterprise Bean, Types of Enterprise Bean, Accessing Enterprise Beans, Enterprise Bean Application, Packaging Enterprise Beans</p> <p><b>Working With Session Beans:</b> When to use Session Beans? Types of Session Beans, Remote and Local Interfaces, Accessing Interfaces, Lifecycle of Enterprise Beans, Packaging Enterprise Beans, Example of Stateful Session Bean, Example of Stateless Session Bean, Example of Singleton Session Beans.</p> <p><b>Working with Message Driven Beans:</b> Lifecycle of a Message Driven Bean, Uses of Message Driven Beans, The Message Driven Beans Example.</p> <p><b>Interceptors:</b> Request And Interceptor, Defining An Interceptor, AroundInvoke Method, Applying Interceptor, Adding An Interceptor To An Enterprise Bean, Build and Run the Web Application.</p> <p><b>Java Naming and Directory Interface:</b> What is Naming Service? What is Directory Service? What is Java Naming and Directory interface? Basic Lookup, JNDI Namespace in Java EE, Resources and JNDI, Datasource Resource Definition in Java EE.</p>	10
VI	<p><b>Persistence, Object/Relational Mapping And JPA:</b> What is Persistence? Persistence in Java, Current Persistence Standards in Java, Why another Persistence Standards? Object/Relational Mapping,</p> <p><b>Introduction to Java Persistence API:</b> The Java Persistence API, JPA, ORM, Database and the Application, Architecture of JPA, How JPA Works? JPA Specifications.</p> <p><b>Writing JPA Application:</b> Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database And Tables in Mysql, Creating a Web Application, Adding the Required Library Files, Creating a Javabean Class, Creating Persistence Unit [Persistence.Xml], Creating JSPS, The JPA Application Structure, Running The JPA Application.</p> <p><b>Introduction to Hibernate:</b> What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works?</p> <p><b>Writing Hibernate Application:</b> Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, Creating a Web Application, Adding The Required Library Files, Creating a Javabean Class, Creating Hibernate Configuration File, Adding a Mapping Class, Creating JSPS, Running The Hibernate Application.</p>	10

**Books and References:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Java EE 7 For Beginners	Sharanam Shah, Vaishali Shah	SPD	First	2017
2.	Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development	Elder Moraes	Packt	First	2018
3.	Advanced Java Programming	Uttam Kumar Roy	Oxford Press		2015

<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>	
<b>Course Name: Core Java Practical</b>		<b>Course Code: UGIT5P6</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	<b>--</b>	<b>--</b>

**List of Practicals:**

**1. Implement the following Simple Servlet applications.**

- a. Create a simple calculator application using servlet.
- b. Create a servlet for a login page. If the username and password are correct then it says message “Hello <username>” else a message “login failed”
- c. Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database.

**2. Implement the following Servlet applications with Cookies and Sessions.**

- a. Using Request Dispatcher Interface create a Servlet which will validate the password entered by the user, if the user has entered "Servlet" as password, then he will be forwarded to Welcome Servlet else the user will stay on the index.html page and an error message will be displayed.
- b. Create a servlet that uses Cookies to store the number of times a user has visited servlet.
- c. Create a servlet demonstrating the use of session creation and destruction. Also check whether the user has visited this page first time or has visited earlier also using sessions.

**3. Implement the Servlet IO and File applications.**

- a. Create a Servlet application to upload and download a file.
- b. Develop Simple Servlet Question Answer Application using Database.
- c. Create simple Servlet application to demonstrate Non-Blocking Read Operation.

**4. Implement the following JSP applications.**

- a. Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.
- b. Develop a simple JSP application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender-radio button).
- c. Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC.

**5. Implement the following JSP JSTL and EL Applications.**

- a. Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a JSP page which will update the employee table of database with matching eno.
- b. Create a JSP page to demonstrate the use of Expression language.
- c. Create a JSP application to demonstrate the use of JSTL.

**6. Implement the following EJB Applications.**

- a. Create a Currency Converter application using EJB.
- b. Develop a Simple Room Reservation System Application Using EJB.
- c. Develop simple shopping cart application using EJB [Stateful Session Bean].

**7. Implement the following EJB applications with different types of Beans.**

- a. Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans.
- b. Develop simple visitor Statistics application using Message Driven Bean [Stateless Session Bean].

c. Develop simple Marks Entry Application to demonstrate accessing Database using EJB.

**8. Implement the following JPA applications.**

a. Develop a simple Inventory Application Using JPA.

b. Develop a Guestbook Application Using JPA.

c. Create simple JPA application to store and retrieve Book details.

**9. Implement the following JPA applications with ORM and Hibernate.**

a. Develop a JPA Application to demonstrate use of ORM associations.

b. Develop a Hibernate application to store Feedback of Website Visitor in MySQL Database.

c. Develop a Hibernate application to store and retrieve employee details in MySQL Database.

**10. Implement the following Hibernate applications.**

a. Develop an application to demonstrate Hibernate One- To -One Mapping Using Annotation.

b. Develop Hibernate application to enter and retrieve course details with ORM Mapping.

c. Develop a five page web application site using any two or three Java EE Technologies.

<b>B. Sc (Information Technology)</b>		<b>Semester – V</b>		
Course Name: <b>Next Generation Technologies</b>		Course Code: UGIT507 (Elective II)		
Periods per week (1 Period is 50 minutes)		5		
Credits		2		
		Hours	Marks	
Evaluation System		Theory Examination	2	60
		Internal	--	40

### Objectives:

The objective of this course Students will learn use of next generation technology like MongoDB. MongoDB is a document oriented database .Students will know the how MongoDb is differ from RDBMS.

### Expected Learning Outcomes:

- Will be able to describe why MongoDb is introduced in market ;
- Will understand the architecture of MongoDb and MongoDb shell
- Will understand MongoDb's scope and limitations
- Will understand the how to use JQuery and Jason

Unit	Details	Lectures
I	<p><b>Big Data:</b> Getting Started, Big Data, Facts About Big Data, Big Data Sources, Three Vs of Big Data, Volume, Variety, Velocity, Usage of Big Data, Visibility, Discover and Analyze Information, Segmentation and Customizations, Aiding Decision Making, Innovation, Big Data Challenges, Policies and Procedures, Access to Data, Technology and Techniques, Legacy Systems and Big Data, Structure of Big Data, Data Storage, Data Processing, Big Data Technologies</p> <p><b>NoSQL:</b> SQL, NoSQL, Definition, A Brief History of NoSQL, ACID vs. BASE, CAP Theorem (Brewer's Theorem), The BASE, NoSQL Advantages and Disadvantages, Advantages of NoSQL, Disadvantages of NoSQL, SQL vs. NoSQL Databases, Categories of NoSQL Databases</p> <p><b>Introducing MongoDB:</b> History, MongoDB Design Philosophy, Speed, Scalability, and Agility, Non-Relational Approach, JSON-Based Document Store, Performance vs. Features, Running the Database Anywhere, SQL Comparison</p>	10
II	<p><b>The MongoDB Data Model:</b> The Data Model, JSON and BSON, The Identifier (_id), Capped Collection, Polymorphic Schemas, ObjectOriented Programming, Schema Evolution</p> <p><b>Using MongoDB Shell:</b> Basic Querying, Create and Insert, Explicitly Creating Collections, Inserting Documents Using Loop, Inserting by Explicitly Specifying _id, Update, Delete, Read, Using Indexes, Stepping Beyond the Basics, Using Conditional Operators, Regular Expressions, MapReduce, aggregate(), Designing an Application's Data Model, Relational Data Modeling and Normalization, MongoDB Document Data Model Approach</p> <p><b>MongoDB Architecture:</b> Core Processes, mongod, mongo, mongos, MongoDB Tools, Standalone Deployment, Replication, Master/Slave Replication, Replica Set, Implementing Advanced Clustering with Replica Sets, Sharding, Sharding Components, Data Distribution</p>	10

	Process, Data Balancing Process, Operations, Implementing Sharding, Controlling Collection Distribution (Tag-Based Sharding), Points to Remember When Importing Data in a Sharded Environment, Monitoring for Sharding, Monitoring the Config Servers, Production Cluster Architecture, Scenario 1, Scenario 2, Scenario 3, Scenario 4	
III	<p><b>MongoDB Storage Engine:</b> Data Storage Engine, Data File (Relevant for MMAPv1), Namespace (.ns File), Data File (Relevant for WiredTiger), Reads and Writes, How Data Is Written Using Journaling, GridFS – The MongoDB File System, The Rationale of GridFS, GridFS under the Hood, Using GridFS, Indexing, Types of Indexes, Behaviors and Limitations</p> <p><b>MongoDB Use Cases:</b> Use Case 1 -Performance Monitoring, Schema Design, Operations, Sharding, Managing the Data, Use Case 2 – Social Networking, Schema Design, Operations, Sharding</p> <p><b>MongoDB Limitations:</b> MongoDB Space Is Too Large (Applicable for MMAPv1), Memory Issues (Applicable for Storage Engine MMAPv1), 32-bit vs. 64-bit, BSON Documents, Namespaces Limits, Indexes Limit, Capped Collections Limit - Maximum Number of Documents in a Capped Collection, Sharding Limitations, Shard Early to Avoid Any Issues, Shard Key Can't Be Updated, Shard Collection Limit, Select the Correct Shard Key, Security Limitations, No Authentication by Default, Traffic to and from MongoDB Isn't Encrypted, Write and Read Limitations, Case-Sensitive Queries, Type Sensitive Fields, No JOIN, Transactions, MongoDB Not Applicable Range</p> <p><b>MongoDB Best Practices:</b> Deployment, Hardware Suggestions from the MongoDB Site, Few Points to be Noted, Coding, Application Response Time Optimization, Data Safety, Administration, Replication Lag, Sharding, Monitoring</p>	10
IV	<b>The End of Disk?</b> SSD and In-Memory Databases: The End of Disk?, Solid State Disk, The Economics of Disk, SSD-Enabled Databases, In-Memory Databases, TimesTen, Redis, SAP HANA, VoltDB, Oracle 12c “in-Memory Database, Berkeley Analytics Data Stack and Spark, Spark Architecture	10
V	<b>jQuery:</b> Introduction, Traversing the DOM, DOM Manipulation with jQuery, Events, Ajax with jQuery, jQuery Plug-ins, jQuery Image Slider	10
VI	<b>JSON:</b> Introduction, JSON Grammar, JSON Values, JSON Tokens, Syntax, JSON vs XML, Data Types, Objects, Arrays, Creating JSON, JSON Object, Parsing JSON, Persisting JSON, Data Interchange, JSON PHP, JSON HTML, JSONP	10

**Books and References:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Practical MongoDB	Shakuntala Gupta Edward NavinSabharwal	Apress		
2.	Beginning jQuery	Jack Franklin Russ Ferguson	Apress	Second	
3.	Next Generation Databases	Guy Harrison,	Apress		
4.	Beginning JSON	Ben Smith	Apress	Fourth	



<b>B. Sc (Information Technology)</b>			<b>Semester – V</b>	
<b>Course Name:Next Generation TechnologiesPractical</b>			<b>Course Code: UGIT5P7 (Elective II)</b>	
<b>Periods per week (1 Period is 50 minutes)</b>			<b>3</b>	
<b>Credits</b>			<b>2</b>	
			<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
		<b>Internal</b>	<b>--</b>	<b>--</b>

**List of Practical:**

<b>Practical No</b>	<b>Details</b>
<b>1</b>	<b>MongoDB Basics</b>
a	Write a MongoDB query to create and drop database.
b	Write a MongoDB query to create, display and drop collection
c	Write a MongoDB query to insert, query, update and delete a document.
<b>2</b>	<b>Simple Queries with MongoDB</b>
<b>3</b>	<b>Implementing Aggregation</b>
a	Write a MongoDB query to use sum, avg, min and max expression.
b	Write a MongoDB query to use push and addToSet expression.
c	Write a MongoDB query to use first and last expression.
<b>4</b>	<b>Replication, Backup and Restore</b>
a	Write a MongoDB query to create Replica of existing database.
b	Write a MongoDB query to create a backup of existing database.
c	Write a MongoDB query to restore database from the backup.
<b>5</b>	<b>Java and MongoDB</b>
a	Connecting Java with MongoDB and inserting, retrieving, updating and deleting.
<b>6</b>	<b>PHP and MongoDB</b>
a	Connecting PHP with MongoDB and inserting, retrieving, updating and deleting.
<b>7</b>	<b>Python and MongoDB</b>
a	Connecting Python with MongoDB and inserting, retrieving, updating and deleting.
<b>8</b>	<b>Programs on Basic jQuery</b>
a	jQuery Basic, jQuery Events
b	jQuery Selectors, jQuery Hide and Show effects
c	jQuery fading effects, jQuery Sliding effects
<b>9</b>	<b>jQuery Advanced</b>
a	jQuery Animation effects, jQuery Chaining
b	jQuery Callback, jQuery Get and Set Contents
c	jQuery Insert Content, jQuery Remove Elements and Attribute
<b>10</b>	<b>JSON</b>
a	Creating JSON
b	Parsing JSON
c	Persisting JSON
<b>11</b>	<b>Create a JSON file and import it to MongoDB</b>
a	Export MongoDB to JSON.

**Semester – VI**

<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: <b>Security in Computing</b>		Course Code: <b>UGIT602</b>	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>2</b>
		<b>Internal</b>	<b>60</b>
		<b>--</b>	<b>40</b>

### Objectives:

The purpose of this course is to provide understanding of the main issues related to security in modern networked computer systems. This covers underlying concepts and foundations of computer security, basic knowledge about security-relevant decisions in designing IT infrastructures, techniques to secure complex systems and practical skills in managing a range of systems, from personal laptop to large-scale infrastructures.

### Expected Learning Outcomes:

- Student will be able to understand the Security in computing concept.
- Student will be able to implement the AAA Authentication.
- Student will be able to Configure, Apply and Verify an Extended Numbered ACL.
- Student will be able to Configure IP ACLs to Mitigate Attacks and IPV6 ACLs.
- Student will be able to understand and implement a Zone-Based Policy Firewall
- Student will be able to implement Layer 2 Security.
- Student will be able to understand, design, and implement ASA Basic Settings and Firewall Using CLI.

Unit	Details	Lectures
I	<p><b>1. Information Security Overview:</b> The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls.</p> <p><b>2. Risk Analysis:</b> Threat Definition, Types of Attacks, Risk Analysis.</p> <p><b>3. Secure Design Principles:</b> The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense.</p>	10
II	<p><b>4. Authentication and Authorization :</b> Authentication, Authorization</p> <p><b>5. Encryption:</b> A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure.</p> <p><b>6. Storage Security:</b> Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices.</p>	10
III	<p><b>7. Database Security:</b> General Database Security Concepts, Understanding Database Security Layers, Understanding Database Level Security, Using Application Security, Database Backup and Recovery, Keeping Your Servers Up to Date, Database Auditing and Monitoring.</p>	10

	<p><b>8. Secure Network Design:</b> Introduction to Secure Network Design, Performance, Availability, and Security.</p> <p><b>9. Network Device Security:</b> Switch and Router Basics, Network Hardening.</p>	
IV	<p><b>10. Firewalls:</b> Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.</p> <p><b>11. Wireless Network Security:</b> Radio Frequency Security Basics, Data Link Layer Wireless Security Features, Flaws, and Threats, Wireless Vulnerabilities and Mitigations, Wireless Network Hardening Practices and Recommendations, Wireless Intrusion Detection and Prevention, Wireless Network Positioning and Secure Gateways.</p>	10
V	<p><b>12. Intrusion Detection and Prevention Systems:</b> IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM).</p> <p><b>13. Voice over IP (VoIP) and PBX Security:</b> Background, VoIP Components, VoIP Vulnerabilities and Countermeasures, PBX, TEM: Telecom Expense Management.</p> <p><b>14. Operating System Security Models:</b> Operating System Models, Classic Security Models, Reference Monitor, Trustworthy Computing, International Standards for Operating System Security.</p>	10
VI	<p><b>15. Virtual Machines and Cloud Computing:</b> Virtual Machines, Cloud Computing.</p> <p><b>16. Secure Application Design:</b> Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, And Remote Administration Security.</p> <p><b>17. Physical Security:</b> Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets: Locks and Entry Controls, Physical Intrusion Detection</p>	10

**Books and References:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	The Complete Reference: Information Security	Mark Rhodes-Ousley	MC Graw-Hill	2 <sup>nd</sup>	2013
2.	Essential Cybersecurity Science	Josiah Dykstra	O'Reilly	5 <sup>th</sup>	2017
3.	Principles of Computer Security: CompTIA Security+ and Beyond	Wm. Arthur Conklin, Greg White	MC Graw-Hill	2 <sup>nd</sup>	2010

<b>B. Sc (Information Technology)</b>			<b>Semester – VI</b>	
<b>Course Name: Security in Computing Practical</b>			<b>Course Code: UGIT6P2</b>	
<b>Periods per week (1 Period is 50 minutes)</b>			<b>3</b>	
<b>Credits</b>			<b>2</b>	
			<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
		<b>Internal</b>	<b>--</b>	<b>--</b>

<b>List of Practical:</b>	
<b>Practical No</b>	<b>Details</b>
<b>1</b>	<b>Configure Routers</b>
A	OSPF MD5 authentication.
B	NTP
C	To log messages to the syslog server
D	To support SSH connections.
<b>2</b>	<b>Configure AAA Authentication</b>
A	Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA
B	Verify local AAA authentication from the Router console and the PC-A client
<b>3</b>	<b>Configuring Extended ACLs</b>
A	Configure, Apply and Verify an Extended Numbered ACL
<b>4</b>	<b>Configure IP ACLs to Mitigate Attacks and IPV6 ACLs</b>
A	Verify connectivity among devices before firewall configuration.
B	Use ACLs to ensure remote access to the routers is available only from management station PC-C.
C	Configure ACLs on to mitigate attacks.
D	Configuring IPv6 ACLs
<b>5</b>	<b>Configuring a Zone-Based Policy Firewall</b>
<b>6</b>	<b>Configure IOS Intrusion Prevention System (IPS) Using the CLI</b>
A	Enable IOS IPS.
B	Modify an IPS signature.
<b>7</b>	<b>Layer 2 Security</b>
A	Assign the Central switch as the root bridge.
B	Secure spanning-tree parameters to prevent STP manipulation attacks.
C	Enable port security to prevent CAM table overflow attacks.
<b>8</b>	<b>Layer 2 VLAN Security</b>
<b>9</b>	<b>Configure and Verify a Site-to-Site IPsec VPN Using CLI</b>
<b>10</b>	<b>Configuring ASA Basic Settings and Firewall Using CLI</b>
A	Configure basic ASA settings and interface security levels using CLI
B	Configure routing, address translation, and inspection policy using CLI

C	Configure DHCP, AAA, and SSH and Configure a DMZ, Static NAT, and ACLs
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<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: <b>Business Intelligence</b>		Course Code: <b>UGIT603</b>	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	Marks
Evaluation System		Theory Examination	2
		Internal	60
			40

### Objectives:

The objective of this course is to teach the key concept and issue related to business intelligence and decision support system. It focus on data warehouses, design methods and ETL Processes and OLAP system. It is very essential to make better decision on the basis of analysis and make it sure that it is performing great and as per the specifications.

### Expected Learning Outcomes:

- Develop methods and procedures for Analysis that can help for large systems and that can be used to Making a decision within a time
- Student will able to improve decision making capabilities when they assess the BI Architecture.
- Student will able to improve decision making capabilities when they assess the BI Architecture.
- Student will able to build and enhance business intelligence capabilities by adapting the appropriate technology and software solutions.
- Student will able to understand methods and tools of BI.

Unit	Details	Lectures
I	<b>Business intelligence:</b> Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence <b>Decision support systems:</b> Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system	10
II	<b>Data Warehouse:</b> Definition of data warehouse, Datamarts , Data quality , Data warehouse architecture, ETL tools, Metadata , Cubes and multidimensional analysis <b>Mathematical models for decision making:</b> Structure of mathematical models, Development of a model, Classes of models	10
III	<b>Data mining:</b> Definition of data mining, Representation of input data , Data mining process, Analysis methodologies <b>Data preparation:</b> Data validation, Data transformation, Data reduction	10
IV	<b>Classification:</b> Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines <b>Clustering:</b> Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models	10

V	<p><b>Business intelligence applications:</b>  <b>Marketing models:</b> Relational marketing, Sales force management,  <b>Logistic and production models:</b> Supply chain optimization,  Optimization models for logistics planning, Revenue management systems.  <b>Data envelopment analysis:</b> Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices</p>	10
VI	<p><b>Knowledge Management:</b> Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management  <b>Artificial Intelligence and Expert Systems:</b>  Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems</p>	10

**Books and References:**

Title	Author/s	Edition	Publisher	Year
Business Intelligence: Data Mining and Optimization for Decision Making	Carlo Vercellis	Wiley	First	2009
Decision support and Business Intelligence Systems	Efraim Turban, Ramesh Sharda, DursunDelen	Pearson	Ninth	2011
Fundamental of Business Intelligence	Grossmann W, Rinderle-Ma	Springer	First	2015

<b>B. Sc (Information Technology)</b>			<b>Semester – VI</b>		
<b>Course Name: Business Intelligence Practical</b>			<b>Course Code: UGIT6P3</b>		
<b>Periods per week (1 Period is 50 minutes)</b>			<b>3</b>		
<b>Credits</b>			<b>2</b>		
			<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>		<b>Practical Examination</b>	<b>2½</b>		<b>50</b>
		<b>Internal</b>	<b>--</b>		<b>--</b>

**List of Practicals:**

<b>Practical No</b>	<b>Details</b>
<b>1</b>	Import the legacy data from different sources such as ( Excel , SqlServer, Oracle etc.) and load in the target system. ( You can download sample database such as Adventureworks, Northwind, foodmart etc.)
<b>2</b>	Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sqlserver.
<b>3</b>	a. Create the Data staging area for the selected database. b. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.
<b>4</b>	a. Create the ETL map and setup the schedule for execution. b. Execute the MDX queries to extract the data from the datawarehouse
<b>5</b>	a. Import the datawarehouse data in Microsoft Excel and create the Pivot table and Pivot Chart. b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis.
<b>6</b>	Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data.
<b>7</b>	Perform the data classification using classification algorithm.
<b>8</b>	Perform the data clustering using clustering algorithm.
<b>9</b>	Perform the Linear regression on the given data warehouse data.
<b>10</b>	Perform the logistic regression on the given data warehouse data.



<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
<b>Course Name: Principles of Geographic Information System</b>		<b>Course Code: UGIT604</b>	
<b>Periods per week (1 Period is 50 minutes)</b>		<b>5</b>	
<b>Credits</b>		<b>2</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>2</b>
		<b>Internal</b>	<b>60</b>
		<b>--</b>	<b>40</b>

**Objectives:**

The objective of this course Students will learn how to compile, analyze, and present geospatial data while emphasizing the value of visual communication. Students will learn these basic geospatial concepts while working with QGIS software.

**Expected Learning Outcomes:**

- Will be able to describe what geography and GIS are;
- Will understand the importance of scale, projection, and coordinate systems in GIS;
- Will understand vector and raster data structures and the appropriate use of each of these data structures;
- Will understand the basics of data capture, storage, analysis, and output in a GIS;
- Will understand typical uses of GIS in business, government, and resource management

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<p><b>A Gentle Introduction to GIS</b>  <b>The nature of GIS:</b> Some fundamental observations, Defining GIS, GISystems, GIScience and GIApplications, Spatial data and Geoinformation.  <b>The real world and representations of it:</b> Models and modelling, Maps, Databases, Spatial databases and spatial analysis</p> <p><b>Geographic Information and Spatial Database</b>  <b>Models and Representations of the real world Geographic Phenomena:</b> Defining geographic phenomena, types of geographic phenomena, Geographic fields, Geographic objects, Boundaries  <b>Computer Representations of Geographic Information:</b> Regular tessellations, irregular tessellations, Vector representations, Topology and Spatial relationships, Scale and Resolution, Representation of Geographic fields, Representation of Geographic objects  <b>Organizing and Managing Spatial Data</b>  <b>The Temporal Dimension</b></p>	<b>10</b>
<b>II</b>	<p><b>Data Management and Processing Systems</b>  <b>Hardware and Software Trends</b>  <b>Geographic Information Systems:</b> GIS Software, GIS Architecture and functionality, Spatial Data Infrastructure (SDI)</p>	<b>10</b>

	<p><b>Stages of Spatial Data handling:</b> Spatial data handling and preparation, Spatial Data Storage and maintenance, Spatial Query and Analysis, Spatial Data Presentation.</p> <p><b>Database management Systems:</b> Reasons for using a DBMS, Alternatives for data management, The relational data model, Querying the relational database.</p> <p><b>GIS and Spatial Databases:</b> Linking GIS and DBMS, Spatial database functionality.</p>	
III	<p><b>Spatial Referencing and Positioning</b></p> <p><b>Spatial Referencing:</b> Reference surfaces for mapping, Coordinate Systems, Map Projections, Coordinate Transformations</p> <p><b>Satellite-based Positioning:</b> Absolute positioning, Errors in absolute positioning, Relative positioning, Network positioning, code versus phase measurements, Positioning technology</p>	10
IV	<p><b>Data Entry and Preparation</b></p> <p><b>Spatial Data Input:</b> Direct spatial data capture, Indirect spatial data capture, Obtaining spatial data elsewhere</p> <p><b>Data Quality:</b> Accuracy and Positioning, Positional accuracy, Attribute accuracy, Temporal accuracy, Lineage, Completeness, Logical consistency</p> <p><b>Data Preparation:</b> Data checks and repairs, Combining data from multiple sources</p> <p><b>Point Data Transformation:</b> Interpolating discrete data, Interpolating continuous data</p>	10
V	<p><b>Spatial Data Analysis</b></p> <p><b>Classification of analytical GIS Capabilities</b></p> <p><b>Retrieval, classification and measurement:</b> Measurement, Spatial selection queries, Classification</p> <p><b>Overlay functions:</b> Vector overlay operators, Raster overlay operators</p> <p><b>Neighbourhood functions:</b> Proximity computations, Computation of diffusion, Flow computation, Raster based surface analysis</p> <p><b>Analysis:</b> Network analysis, interpolation, terrain modelling</p> <p><b>GIS and Application models:</b> GPS, Open GIS Standards, GIS Applications and Advances</p> <p><b>Error Propagation in spatial data processing:</b> How Errors propagate, Quantifying error propagation.</p>	10
VI	<p><b>Data Visualization</b></p> <p><b>GIS and Maps, The Visualization Process</b></p> <p><b>Visualization Strategies: Present or explore?</b></p> <p><b>The cartographic toolbox:</b> What kind of data do I have? How can I map my data?</p> <p><b>How to map?:</b> How to map qualitative data, How to map quantitative data, How to map the terrain elevation, How to map time series</p> <p><b>Map Cosmetics, Map Dissemination</b></p>	10

#### Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Principles of Geographic Information Systems- An Introductory Text Book	Editors: Otto Huisman and Rolf A.	The International Institute of Geoinformation Science and Earth Observation	Fourth	2009
2.	Principles of Geographic Information Systems	P.A Burrough and R.A.McDonnell	Oxford University Press	Third	1999

3.	Fundamentals of Spatial Information Systems,	R.Laurini and D. Thompson,	Academic Press		1994
4.	Fundamentals of Geographic Information Systems	Michael N.Demers	Wiley Publications	Fourth	2009
5.	Introduction to Geographic Information Systems	Chang Kang-tsung (Karl),	McGrawHill	Any above 3rd Edition	2013 7th Edition
6.	GIS Fundamentals: A First Text on Geographic Information Systems	Paul Bolsatd	XanEdu Publishing Inc	5th Edition	

<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>		
<b>Course Name: Principles of Geographic Information System</b>		<b>Course Code: UGIT6P4</b>		
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>		
<b>Credits</b>		<b>2</b>		
		<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>		<b>50</b>
	<b>Internal</b>	<b>--</b>		<b>--</b>

**List of Practical:**

<b>Practical NO</b>	<b>Details</b>
<u>0</u>	Familiarizing Quantum GIS: Installation of QGIS, datasets for both Vector and Raster data, Maps.
<u>1</u>	Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics
<u>2</u>	Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping
<u>3</u>	Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data
<u>4</u>	Working with attributes, terrain Data
<u>5</u>	Working with Projections and WMS Data
<u>6</u>	Georeferencing Topo Sheets and Scanned Maps Georeferencing Aerial Imagery Digitizing Map Data
<u>7</u>	Managing Data Tables and Spatial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries
<u>8</u>	Advanced GIS Operations 1: Nearest Neighbour Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data
<u>9</u>	Advance GIS Operations 2: Batch Processing using Processing Framework Automating Complex Workflows using Processing Modeler Automating Map Creation with Print Composer Atlas
<u>10</u>	Validating Map data

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<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: <b>Enterprise Networking</b>		Course Code: UGIT605 (Elective I)	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	2	60
	<b>Internal</b>	--	40

**Objectives:**

Enterprise networking teaches students some of the advanced technologies for designing, implementing, and managing enterprise-wide computer networks. It begins with some fundamental concepts and theories for those with limited knowledge of data communication and computer networks.

**Expected Learning Outcomes:**

- analyze state-of-the-art real-world enterprise-wide networks;
- design, build, and implement advanced enterprise-wide computer networks;
- manage, configure, troubleshoot, and maintain typical enterprise-wide computer networks;
- effectively communicate course work in writing and oral presentation.

Unit	Details	Lectures
I	<p><b>General Network Design:</b> Network Design Methodology, Architectures for the Enterprise, Borderless Networks Architecture, Collaboration and Video Architecture, Data Center and Virtualization Architecture, Design Lifecycle: Plan, Build, Manage Plan Phase Build Phase Manage Phase Prepare, Plan, Design, Implement, Operate, and Optimize Phases Prepare Phase Plan Phase Design Phase Implement Phase Operate Phase Optimize Phase Summary of PPDIOO Phases Project Deliverables Design Methodology Identifying Customer Design Requirements Characterizing the Existing Network Steps in Gathering Information Network Audit Tools Network Checklist Designing the Network Topology and Solutions Top-Down Approach Pilot and Prototype Tests Design Document</p> <p><b>Network Design Models:</b> Hierarchical Network Models Benefits of the Hierarchical Model, Hierarchical Network Design, Core Layer, Distribution Layer, Access Layer, Hierarchical Model Examples, Huband-Spoke, Design Collapsed Core, Design Enterprise Architecture Model, Enterprise Campus Module, Enterprise Edge Area, ECommerce Module, Internet Connectivity Module, VPN/Remote Access, Enterprise WAN, Service Provider Edge Module, Remote Modules, Enterprise Branch Module, Enterprise</p>	10

	Data Center Module, Enterprise Teleworker Module, High Availability Network Services, Workstation-to-Router Redundancy and LAN, High Availability Protocols, ARP Explicit Configuration, RDP, RIP, HSRP, VRRP, GLBP, Server Redundancy, Route Redundancy, Load Balancing, Increasing Availability, Link Media Redundancy	
II	<b>Enterprise LAN Design:</b> LAN Media, Ethernet Design Rules, 100Mbps Fast Ethernet Design Rules, Gigabit Ethernet Design Rules, 1000BASE-LX Long-Wavelength Gigabit Ethernet, 1000BASE-SX Short-Wavelength Gigabit Ethernet, 1000BASE-CX Gigabit Ethernet over Coaxial Cable, 1000BASE-T Gigabit Ethernet over UTP 86, 10 Gigabit Ethernet Design Rules, 10GE Media Types, EtherChannel, Comparison of Campus Media LAN Hardware, Repeaters, Hubs, Bridges, Switches, Routers, Layer 3 Switches, Campus LAN Design and Best Practices Best Practices for Hierarchical Layers, Access Layer Best Practices, Distribution Layer Best Practices, Core Layer Best Practices, STP Design Considerations, STP Toolkit, PortFast, UplinkFast, BackboneFast, Loop Guard, Root Guard, BPDU Guard, BPDU Filter, VLAN and Trunk Considerations, Unidirectional Link Detection (UDLD) Protocol, Large-Building LANs, Enterprise Campus LANs, Edge Distribution, Medium-Size LANs, Small and Remote Site LANs, Server Farm Module, Server Connectivity Options, Enterprise Data Center Infrastructure, Campus LAN QoS Considerations, Multicast Traffic Considerations, CGMP, IGMP Snooping	10
III	<b>Data Center Design:</b> Enterprise DC Architecture, Data Center Foundation Components, Data Center Topology Components, Data Center Network Programmability, SDN, Controllers, APIs, ACI, Challenges in the DC, Data Center Facility Aspects, Data Center Space, Data Center Power, Data Center Cooling, Data Center Heat, Data Center Cabling, Enterprise DC Infrastructure, Data Center Storage, Data Center Reference Architecture, Defining the DC Access Layer, Defining the DC Aggregation Layer, Defining the DC Core Layer, Security in the DC, Fabric Extenders, Virtualization Overview, Challenges, Defining Virtualization and Benefits, Virtualization Risks, Types of Virtualization, Virtualization Technologies, VSS, VRF, vPC, Device Contexts, Server Virtualization, Server Scaling, Virtual Switching, Network Virtualization Design Considerations, Access Control, Path Isolation, Services Edge, Data Center Interconnect, DCI Use Cases, DCI Transport Options, DCI L2 Considerations, Load Balancing in the DC, Application Load Balancing, Network Load Balancing	10
IV	<b>Wireless LAN Design:</b> Wireless LAN Technologies, WLAN Standards, ISM and UNII Frequencies, Summary of WLAN Standards, Service Set Identifier, WLAN Layer 2 Access Method, WLAN Security, Unauthorized Access, WLAN Security Design Approach, IEEE 802.1X-2001 Port-Based Authentication, Dynamic WEP Keys and LEAP, Controlling WLAN Access to Servers, WLAN Authentication, Authentication Options, WLAN Controller Components, WLC Interface Types, AP Controller Equipment Scaling, Roaming and Mobility Groups, Intracontroller Roaming, Layer 2 Intercontroller Roaming, Layer 3 Intercontroller Roaming, Mobility Groups, WLAN Design, Controller Redundancy Design: Deterministic vs. Dynamic, N+1 WLC Redundancy, N+N WLC Redundancy, N+N+1 WLC Redundancy, Radio Management and	10

	<p>Radio Groups, RF Groups, RF Site Survey, Using EoIP Tunnels for Guest Services, Wireless Mesh for Outdoor Wireless, Mesh Design Recommendations, Campus Design Considerations, Power over Ethernet (PoE), Wireless and Quality of Service (QoS), Branch Design Considerations, Local MAC, REAP, Hybrid REAP, Branch Office Controller Options.</p> <p><b>WAN Technologies and the Enterprise Edge:</b> WAN and Enterprise Edge Overview, Definition of WAN, WAN Edge Module, Enterprise Edge Modules, WAN Transport Technologies, ISDN, ISDN BRI Service, ISDN PRI Service, Digital Subscriber Line, Cable, Wireless, Frame Relay, Time-Division Multiplexing, Metro Ethernet, SONET/SDH, Multiprotocol Label Switching (MPLS), Dark Fiber, Dense Wavelength-Division Multiplexing, Ordering WAN Technology and Contracts, WAN and Edge Design Methodologies, Response Time, Throughput, Reliability, Bandwidth Considerations, WAN Link Categories, Optimizing Bandwidth Using QoS, Queuing, Traffic Shaping and Policing, Classification, Congestion Management, Priority Queuing, Custom Queuing, Weighted Fair Queuing, Class-Based Weighted Fair Queuing, Low-Latency Queuing, Traffic Shaping and Policing, Link Efficiency, Window Size, DMZ Connectivity, Segmenting DMZs, DMZ Services, Internet Connectivity, Centralized Internet (Branch) vs. Direct Internet (Branch), High Availability for the Internet Edge, VPN Network Design.</p> <p><b>WAN Design</b>  Traditional WAN Technologies Hub-and-Spoke Topology Full-Mesh Topology Partial-Mesh Topology Point-to-Point Topology Remote Site Connectivity Enterprise VPN vs. Service Provider VPN Enterprise Managed VPN: IPsec IPsec Direct Encapsulation Generic Routing Encapsulation IPsec DMVPN IPsec Virtual Tunnel Interface Design GETVPN Service Provider-Managed Offerings ,Metro Ethernet Service Provider VPNs: L2 vs. L3 ,Virtual Private Wire Services VPWS L2 VPN Considerations ,Virtual Private LAN Services VPLS L2 VPN Considerations ,MPLS, MPLS Layer 3 Design Overview MPLS L3 VPN Considerations ,VPN Benefits WAN Backup Design WAN Backup over the Internet Enterprise WAN Architecture Cisco Enterprise MAN/WAN Enterprise WAN/MAN Architecture Comparison ,Enterprise WAN Components Comparing Hardware and Software Enterprise Branch Architecture Branch Design Branch Connectivity Redundancy for Branches Single WAN Carrier vs. Dual WAN Carriers Single MPLS Carrier Site ,Dual MPLS Carriers Hybrid WAN: L3 VPN with IPsec VPN ,Internet for Branches Flat Layer 2 vs. Collapsed Core ,Enterprise Branch Profiles Small Branch Design Medium Branch Design Large Branch Design Enterprise Teleworker Design ,ISRs for Teleworkers</p>	
V	<p>Internet Protocol Version 4 Design,IPv4 Header ToS IPv4 Fragmentation IPv4 Addressing ,IPv4 Address Classes Class A Addresses Class B Addresses ,Class C Addresses Class D Addresses Class E Addresses ,IPv4 Address Types IPv4 Private Addresses NAT ,IPv4 Address Subnets Mask Nomenclature IP Address Subnet Design Example Determining the Network Portion of an IP Address VariableLength Subnet Masks, Loopback Addresses IP Telephony Networks ,IPv4 Addressing Design Goal of IPv4 Address Design ,</p>	10

	<p>Plan for Future Use of IPv4 Addresses , Performing Route Summarization , Plan for a Hierarchical IP Address Network , Private and Public IP Address and NAT Guidelines , Steps for Creating an IPv4 Address Plan Case Study: IP Address Subnet Allocation , Address Assignment and Name Resolution , Recommended Practices of IP Address Assignment , BOOTP DHCP DNS , Internet Protocol Version 6 Design, IPv6 Header IPv6 Address Representation IPv4-Compatible IPv6 Addresses IPv6 Prefix Representation IPv6 Address Scope Types and Address Allocations IPv6 Address Allocations IPv6 Unicast Address Global Unicast Addresses Link-Local Addresses , Unique Local IPv6 Address Global Aggregatable IPv6 Address , IPv4-Compatible IPv6 Address IPv6 Anycast Addresses , IPv6 Multicast Addresses IPv6 Mechanisms ICMPv6 , IPv6 Neighbor Discovery Protocol IPv6 Name Resolution , Path MTU Discovery IPv6 Address-Assignment Strategies , Manual Configuration SLAAC of Link-Local Address , SLAAC of Globally Unique IPv6 Address DHCPv6 , DHCPv6 Lite IPv6 Security IPv6 Routing Protocols RIPng OSPFv3 , BGP4 Multiprotocol Extensions (MP-BGP) for IPv6 , IPv6 Addressing Design , Planning for Addressing with IPv6 , Route Summarization with IPv6 IPv6 Private Addressing IPv6 for the Enterprise IPv6 Address Allocation , Partly Linked IPv4 Address into IPv6, Whole IPv4 Address Linked into IPv6 IPv6 Addresses Allocated Per Location and/or Type , IPv4-to-IPv6 Transition Mechanisms and Deployment Models , Dual-Stack Mechanism IPv6 over IPv4 Tunnels , Protocol Translation Mechanisms IPv6 Deployment Models , Dual-Stack Model Hybrid Model Service Block Model ,IPv6 Deployment Model Comparison IPv6 Comparison with IPv4 ,OSPF, BGP, Route Manipulation, and IP Multicast,OSPFv2 OSPFv2 Metric OSPFv2 Adjacencies and Hello Timers , OSPFv2 Areas OSPF Area Design Considerations OSPF Router Types OSPF DRs LSA Types Autonomous System External Path Types OSPF Stub Area Types Stub Areas Totally Stubby Areas , NSSAs Virtual Links OSPFv2 Router Authentication , OSPFv2 Summary OSPFv3 OSPFv3 Changes from OSPFv2, OSPFv3 Areas and Router Types OSPFv3 LSAs OSPFv3 Summary BGP BGPNeighborseBGPIBGP Route Reflectors Confederations BGP Administrative Distance , BGP Attributes, Weight, and the BGP Decision Process BGP Path Attributes Next-Hop Attribute Local Preference Attribute Origin Attribute Autonomous System Path Attribute MED Attribute Community Attribute Atomic Aggregate and Aggregator Attributes Weight BGP Decision Process , BGP Summary , Route Manipulation PBR Route Summarization Route Redistribution Default Metric OSPF Redistribution Route Filtering Transit Traffic Routing Protocols on the Hierarchical Network Infrastructure IP Multicast Review , Multicast Addresses Layer 3 to Layer 2 Mapping IGMP , IGMPv1 IGMPv2 IGMPv3 CGMP IGMP Snooping , Sparse Versus Dense Multicast Multicast Source and Shared</p> <p>49</p> <p>Trees PIM PIM-SM PIM DR Auto-RP PIMv2 Bootstrap Router , DVMRP IPv6 Multicast Addresses</p>	
<p><b>VI</b></p>	<p>Managing Security Network Security Overview Security Legislation Security Threats Reconnaissance and Port Scanning Vulnerability Scanners Unauthorized Access Security Risks Targets Loss of Availability Integrity Violations and Confidentiality Breaches ,</p>	<p><b>10</b></p>

	<p>Security Policy and Process Security Policy Defined , Basic Approach of a Security Policy Purpose of Security Policies, Security Policy Components Risk Assessment , Risk Index Continuous Security Integrating Security Mechanisms into Network Design Trust and Identity Management , Trust Domains of Trust Identity Passwords Tokens Certificates , Network Access Control Secure Services Encryption Fundamentals Encryption Keys VPN Protocols , Transmission Confidentiality Data Integrity Threat Defense , Physical Security Infrastructure Protection Security Management Solutions Security Solution Network Security Platforms , Trust and Identity Technologies Firewall Fundamentals , Types of Firewalls Next-Gen Firewalls NAT Placement , Firewall Guidelines Firewall ACLs , Identity and Access Control Deployments Detecting and Mitigating Threats IPS/IDS Fundamentals IPS/IDS Guidelines , Threat Detection and Mitigation Technologies , ThreatDetection and Threat-Mitigation Solutions , FirePOWER IPS Security Management Applications , Security Platform Solutions Security Management Network Integrating Security into Network Devices IOS Security , ISR G2 Security Hardware Options Securing the Enterprise , Implementing Security in the Campus Implementing Security in the Data Center Implementing Security in the Enterprise Edge</p> <p>Network Management Protocols, Simple Network Management Protocol SNMP Components , MIB SNMP Message Versions SNMPv1 SNMPv2 SNMPv3 , Other Network Management Technologies RMON , RMON2 NetFlow Compared to RMON and SNMP , CDP LLDP Syslog</p>	
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**Books and References:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	CCDA200-310 Official Cert Guide	ANTHONY BRUNO, CCIE No. 2738 STEVE JORDAN, CCIE No. 11293	<b>Cisco Press</b>		
2.	Network Warrior	Gary A Donabue	<b>O Reilly</b>	2nd	2011



<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: Enterprise Networking Practical		Course Code: UGIT6P5 (Elective I)	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>	<b>50</b>
	<b>Internal</b>	--	--

**List of Practical:**

<b>Practical No</b>	<b>Details</b>
<b>1</b>	<b>Configuring OSPF – I</b>
a	Single-Area OSPF Link Costs and Interface Priorities
b	Multi-Area OSPF with Stub Areas and Authentication
<b>2</b>	<b>Configuring OSPF – II</b>
a	OSPF Virtual Links and Area Summarization
b	OSPF over Frame Relay
<b>3</b>	<b>Redistribution and Administrative Distances</b>
a	Redistribution Between RIP and OSPF
b	Manipulating Administrative Distances
<b>4</b>	<b>BGP</b>
a	Configuring BGP with Default Routing
b	Using the AS_PATH Attribute
c	BGP Route Reflectors and Route Filters
<b>5</b>	<b>IPv6</b>
a	Configuring OSPF for IPv6
b	Configuring 6to4 Tunnels
<b>6</b>	<b>VLANs and EtherChannel</b>
a	Static VLANs, VLAN Trunking, and VTP Domains and Modes
b	Configuring EtherChannel
<b>7</b>	<b>Spanning Tree Protocol</b>
a	Spanning Tree Protocol (STP) Default Behavior
b	Modifying Default Spanning Tree Behavior
<b>8</b>	<b>VLAN and Spanning Tree</b>
a	Per-VLAN Spanning Tree Behavior
b	Multiple Spanning Tree

<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: <b>IT Service Management</b>		Course Code: UGIT606	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	2	60
	<b>Internal</b>	--	40

**Objectives:**

To analyse and determine the present IT infrastructure, services and processes. To create management practices which are futuristic in nature. To formulate a roadmap to elevate the state of the business

**Expected Learning Outcomes:**

- Student will able to understand what is the need of IT Service Management
- Student will able to know what kind of strategies and principles flows in IT industries
- Student can understand problem, challenges, risks factors of IT industries
- Student can understand process of service design
- Student will know need of Continual Service Improvement
- Student can how to implement SCI

<b>Unit</b>	<b>Details</b>	<b>Lectures</b>
<b>I</b>	<p><b>IT Service Management:</b> Introduction, What is service management? What are services? Business Process, Principles of Service management: Specialisation and Coordination, The agency principle, Encapsulation, Principles of systems, The service Life Cycle, Functions and processes across the life cycle.</p> <p><b>Service Strategy Principles:</b> Value creation, Service Assets, Service Provider Service Structures, Service Strategy Principles.</p> <p>Service Strategy: Define the market, Develop the offerings, Develop Strategic Assets, Prepare for execution.</p>	<b>10</b>

<p style="text-align: center;"><b>II</b></p>	<p><b>Challenges, Critical Success factors and risks:</b> Complexity, Coordination and Control, Preserving value, Effectiveness in measurement, Risks.</p> <p><b>Service Design:</b> Fundamentals, Service Design Principles: Goals, Balanced Design, Identifying Service requirements, identifying and documenting business requirements and drivers, Design activities, Design aspects, Subsequent design activities, Design constraints, Service oriented architecture, Business Service Management, Service Design Models</p>	<p style="text-align: center;"><b>10</b></p>
<p style="text-align: center;"><b>III</b></p>	<p><b>Service Design Processes:</b> Service Catalogue Management, Service Level Management, Capacity Management, Availability Management, IT Service Continuity Management, Information Security Management, Supplier Management</p> <p><b>Challenges, Critical Success factors and risks:</b> Challenges, Risks</p> <p><b>Service Transition:</b> Fundamentals, Service Transition Principles: Principles Supporting Service Transition, Policies for Service Transition</p>	<p style="text-align: center;"><b>10</b></p>
<p style="text-align: center;"><b>IV</b></p>	<p><b>Service Transition Processes:</b> Transition planning and support, Change Management, Service Asses Configuration Management, Service and Deployment Management, Service Validation and Testing, Evaluation, Knowledge Management.</p> <p><b>Challenges, Critical Success factors and risks:</b></p> <p><b>Challenges, Critical Success factors, Risks, Service Transition under difficult Conditions</b></p>	<p style="text-align: center;"><b>10</b></p>
<p style="text-align: center;"><b>V</b></p>	<p><b>Service Operation:</b> Fundamentals, Service Operation Principles Functions, groups, teams, departments and divisions, Achieving balance in service operations, Providing service, Operation staff involvement in service design and service transition, Operational Health, Communication, Documentation</p> <p><b>Continual Service Improvement(CSI) Principles:</b> CSI Approach, CSI and organizational change, Ownership, CSI register, External and Internal drivers, Service level management, Knowledge management, The Deming cycle, Service Measurement, IT governance, Frameworks, models, standards and quality Systems, CSI inputs and outputs.</p> <p><b>SI Process:</b> The seven step improvement process</p>	<p style="text-align: center;"><b>10</b></p>
<p style="text-align: center;"><b>VI</b></p>	<p><b>CSI Methods nad Techniques:</b> Methods and techniques, Assessments, benchmarking, Service Measurement, Metrics, Return on Investment, Service reporting, CSI and other service management processes</p> <p><b>Organising for CSI:</b> Organisational development, Functions, roles, Customer Engagement, Responsibility model - RACI, Competence and training.</p> <p><b>Technology considerations:</b> Tools to support CSI activities.</p>	<p style="text-align: center;"><b>10</b></p>

	<b>Implementing CSI:</b> Critical Considerations for implementing CSI, The start, Governance, CSI and organisational change, Communication Strategy and Plan	
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**Books and References:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Publisher</b>	<b>Edition</b>	<b>Year</b>
1.	Beginning ASP.NET 4.5 in C#	Matthew MacDonald	Apress		2012
2.	C# 2015	Anne Bohem and Joel Murach	Murach	Third	2016
3.	Murach's ASP.NET 4.6 Web Programming in C#2015	Mary Delamater and Anne Bohem	SPD	Sixth	2016
4.	ASP.NET 4.0 programming	J. Kanjilal	Tata McGrawHill		2011
5.	Programming ASP.NET	D.Esposito	Microsoft Press (Dreamtech)		2011
6.	Beginning Visual C# 2010	K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner	Wrox (Wiley)		2010

<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>		
<b>Course Name: IT Service Management Practical</b>		<b>Course Code: UGIT6P6</b>		
<b>Periods per week (1 Period is 50 minutes)</b>		<b>3</b>		
<b>Credits</b>		<b>2</b>		
		<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>	<b>Practical Examination</b>	<b>2½</b>		<b>50</b>
	<b>Internal</b>	<b>--</b>		<b>--</b>

**List of Practicals:**

1. **Introduction to Android, Introduction to Android Studio IDE, Application Fundamentals:** Creating a Project, Android Components, Activities, Services, Content Providers, Broadcast Receivers, Interface overview, Creating Android Virtual device, USB debugging mode, Android Application Overview. Simple “Hello World” program.
2. **Programming Resources**  
Android Resources: (Color, Theme, String, Drawable, Dimension, Image)
3. **Programming Activities and fragments**  
Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments.
4. **Programs related to different Layouts**  
Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid View.
5. **Programming UI elements**  
AppBar, Fragments, UI Components
6. **Programming menus, dialog, dialog fragments.**
7. **Programs on Intents, Events, Listeners and Adapters**  
The Android Intent Class, Using Events and Event Listeners
8. **Programs on Services, notification and broadcast receivers.**

9. Database Programming with SQLite
10. Programming threads, handles and a synchronized programs
11. Programming Media API and Telephone API
12. Programming Security and permissions
13. Programming Network Communications and Services (JSON)

<b>B. Sc (Information Technology)</b>		<b>Semester – VI</b>	
Course Name: <b>Cyber Laws</b>		Course Code: <b>UGIT607</b>	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>		<b>Theory Examination</b>	<b>2</b>
		<b>Internal</b>	<b>--</b>
			<b>60</b>
			<b>40</b>

**Objectives:**

The main objective of this course is to make students familiar with the developments that are being taking place in the different areas with the help of Computer Science and Information Technology. To acquaint the students with the national and international legal order relative to these

**Expected Learning Outcomes:**

- Student will be able to understand plan and prepare for all stages of an investigation
- Student will be able to initial response.
- Student will be able to and management interaction.
- Student will be able to investigate various media to collect evidence.
- Student will be able to report them in a way that would be acceptable in the court of law
- Student will be able to use existing statutes to determine who is liable for online: defamation; copyright infringement; and failure to protect data.

Unit	Details	Lectures
<b>I</b>	<b>Power of Arrest Without Warrant Under the IT Act, 2000:</b> A Critique, Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce? Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Check and Balances Against Arbitrary Arrests, Arrest for “About to Commit” an Offence Under the IT Act: A Tribute to Draco, Arrest, But NO Punishment!	<b>10</b>

	<p><b>Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000:</b> Concept of “Cyber Crime “ and the IT Act , 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cyber Cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act , 2000, Network Service Providers, Jurisdiction and Cyber Crime, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.</p>	
II	<p><b>Contracts in the Infotech World:</b> Contracts in the Infotech World, Click-Wrap and Shrink-Wrap Contract: Status under the Indian Contract Act, 1872, Contract Formation Under the Indian Contract Act, 1872, Contract Formation on the Internet, Terms and Conditions of Contracts.</p> <p><b>Jurisdiction in the Cyber World:</b> Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act,2000, Foreign Judgements in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United State of America, Jurisdiction Disputes w.r.t. the Internet in the United State of America.</p>	10
III	<p><b>Battling Cyber Squatters and Copyright Protection in the Cyber World:</b> Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and meaning of Copyright, Copyright Ownership and Assignment, License of Copyright, Copyright Terms and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-Linking and Framing, Liability of ISPs for Copyright Violation in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.</p>	10
IV	<p><b>E-Commerce Taxation: Real Problems in the Virtual World:</b> A Tug of War on the Concept of ‘Permanent Establishment’, Finding the PE in Cross Border E-Commerce, The United Nations Model Tax Treaty, The Law of Double Taxation Avoidance Agreements and Taxable Jurisdiction Over Non-Residents, Under the Income Tax Act, 1961, Tax Agents of Non-Residents under the Income Tax Act,1961 and the Relevance to E-Commerce, Source versus Residence and Classification between Business Income and Royalty, The Impact of the Internet on Customer Duties, Taxation Policies in India: At a Glance.</p> <p><b>Digital Signature, Certifying Authorities and E-Governance:</b> Digital Signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India: A Warning to Babudom!</p>	10
V	<p><b>The Indian Evidence Act of 1872 v. Information Technology Act, 2000:</b> Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act, Amendments to the Bankers Books Evidence Act, 1891 and Reserve Bank of India Act, 1934.</p>	10

<b>VI</b>	<p><b>Protection of Cyber Consumers in India:</b> Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India.</p> <p>Amendments in Indian IT Act 2000</p>	<b>10</b>
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**Books and References:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Cyber Law Simplified	Vivek Sood	TMH Education		2001
2.	Cybersecurity Law	Jeff Kosseff	Wiley		2017



<b>B. Sc (Information Technology)</b>			<b>Semester – VI</b>		
<b>Course Name: Advanced Mobile Programming Practical</b>			<b>Course Code: UGIT6P7</b>		
<b>Periods per week (1 Period is 50 minutes)</b>			<b>3</b>		
<b>Credits</b>			<b>2</b>		
			<b>Hours</b>		<b>Marks</b>
<b>Evaluation System</b>		<b>Practical Examination</b>	<b>2½</b>		<b>50</b>
		<b>Internal</b>	<b>--</b>		<b>--</b>

**List of Practicals:**

**2. Introduction to Android, Introduction to Android Studio IDE, Application**

**Fundamentals:** Creating a Project, Android Components, Activities, Services, Content Providers, Broadcast Receivers, Interface overview, Creating Android Virtual device, USB debugging mode, Android Application Overview. Simple “Hello World” program.

**2. Programming Resources**

Android Resources: (Color, Theme, String, Drawable, Dimension, Image)

**3. Programming Activities and fragments**

Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments.

**4. Programs related to different Layouts**

Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid View.

**5. Programming UI elements**

AppBar, Fragments, UI Components

**6. Programming menus, dialog, dialog fragments .**

**7. Programs on Intents, Events, Listeners and Adapters**

The Android Intent Class, Using Events and Event Listeners

**8. Programs on Services, notification and broadcast receivers.**

**9. Database Programming with SQLite**

- 10. Programming threads, handles and asynchronized programs**
- 11. Programming Media API and Telephone API**
- 12. Programming Security and permissions**
- 13. Programming Network Communications and Services (JSON)**