

SAURASHTRA UNIVERSITY

RAJKOT – INDIA



CURRICULAM

FOR

B.Sc. (I.T.)

Bachelor of Science (Information Technology)

(Semester - 3 and Semester - 4)

Effective From June – 2023

Bachelor of Science (Information Technology)
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

B.Sc. (I.T.) (Semester – 3)			
SR.NO	SUBJECT	NO. OF LECT. PER WEEK	CREDIT
1	CS – 13 Network Technology and Administration	5	5
2	CS – 14 C++ and Object Oriented Programming	5	5
3	CS – 15 RDBMS Using Oracle	5	5
4	CS – 16 Content Management System using Joomla	5	5
5	CS – 17 Practical (Based On CS- 14)	5	5
6	CS – 18 Practical (Based On CS- 15, CS-16)	5	5
Total Credit			30

Note:

1. Credit of each subject is 5. Total credit of semester is 30.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical paper are 100. No internal examination marks in practical papers.

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CS – 13: Network Technology and Administration				
<p>Objectives:</p> <ul style="list-style-type: none"> • Build an understanding of the fundamental concepts of computer networking. • Familiarize with the basic taxonomy and terminology of the computer networking area and advanced networking. • Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. <p>Prerequisites:</p> <ul style="list-style-type: none"> • Basic knowledge of computer networking. 				
No.	Topics	Details	Marks weight In %	Min Lect.
1.	Basics of Network, Network Models and LAN Sharing	<ul style="list-style-type: none"> • Network concepts <ul style="list-style-type: none"> - What is network - Use of network • Network model <ul style="list-style-type: none"> -peer – to – peer -client – server • Network Services <ul style="list-style-type: none"> - File service, Print service, - Comm. service, - Data base service, - Security service, - Application service • Network Access Methods <ul style="list-style-type: none"> - csma / cd, csma / ca, - Token passing, - Polling • Network Topologies <ul style="list-style-type: none"> - Bus, Ring, Star, Mesh, Tree, Hybrid • Advanced <input type="checkbox"/> <input type="checkbox"/> Network Topologies Ethernet, CDDI, FDDI • Communication Methods <ul style="list-style-type: none"> - Unicasting, - Multicasting - Broadcasting • OSI reference model with 7 layers • TCP/IP network model with 4 layers • File And Print Sharing in LAN 	20	12

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		<ul style="list-style-type: none"> • aping of network drive • Disk quota • Encryption • Compression Net meeting 		
2	Transmission Media, Multiplexing & Switching Concepts, IP ADDRESSING	<ul style="list-style-type: none"> • Transmission Media <ul style="list-style-type: none"> - Types of Transmission media - Guided media - Co – Axial Cable, - Twisted Pair Cable, - Crimping of Twisted pair cable - Fiber Optic Cable • Unguided media <ul style="list-style-type: none"> - Infrared, Laser, Radio, Microwave, Bluetooth tech. • Different Frequency Ranges • Multiplexing & Demultiplexing • Multiplexing Types <ul style="list-style-type: none"> - FDM, - TDM, - CDM, - WDM • Switching Tech. <ul style="list-style-type: none"> - Circuit Switching, - Message Switching, - Packet Switching • What is ip address? • Types of ip address • ipv4 <ul style="list-style-type: none"> - Class structure - subneting, supernetting • ipv6 <ul style="list-style-type: none"> - Basic structure of ipv6 - Implementation of ipv6 <p style="text-align: center;">Migration from ipv4 to ipv6</p>	20	12
3	Network devices, Network Protocols	<ul style="list-style-type: none"> • CABLE NETWORK DEVICES • LAYER1 DEVICES <ul style="list-style-type: none"> - LAN CARD, - MODEM , - DSL & ADSL - HUB(Active, Passive, Smart hub) - REPEATER 	20	12

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		<ul style="list-style-type: none"> • LAYER2 DEVICES <ul style="list-style-type: none"> - SWITCH(Manageable, nonmanagable) - BRIDGE(Source route, Transactional) • LAYER3 DEVICES <ul style="list-style-type: none"> - ROUTER - LAYER3 SWITCH - BROUTER - GATEWAY - Network Printer • WIRELESS NETWORK DEVICES <ul style="list-style-type: none"> Wireless switch Wireless router, ACCESSPOINT • Packets & Protocols • □ Conn. Oriented protocols -TCP & connection less protocols-UDP • TCP/IP STACK <ul style="list-style-type: none"> - HTTP, - FTP, - SMTP, - POP3 - SNMP, - TELNET - ARP, - RARP • IPX/SPX • AppleTalk, • NetBIOS Name PROTOCOL <ul style="list-style-type: none"> L2CAP, RFCOMM Protocol 		
4	Network Routing, Windows 2008 server	<ul style="list-style-type: none"> • What is routing • Requirements of routing • Types of Routing <ul style="list-style-type: none"> - static - dynamic - default • Routing protocols <ul style="list-style-type: none"> - Exterior Routing protocol <ul style="list-style-type: none"> 1)BGP - Interior Routing protocol <ul style="list-style-type: none"> (1)Distance vector routing <ul style="list-style-type: none"> - RIP - IGRP - EIGRP (2)Link state routing <ul style="list-style-type: none"> - OSPF - IS IS 	20	12

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		<ul style="list-style-type: none"> • Installation of 2008 enterprise server • Various editions of windows 2008 server • Installation & Configuration of Active Directory <ul style="list-style-type: none"> - Domains, Trees, Forests concept • Accounts(User, Group,Computer) • Policy (Security and audit) • Logging Events • MMC(Microsoft Management console) 		
5	Basics of Network Security, Internet connection & Sharing	<ul style="list-style-type: none"> • Fundamental of Network Security • Requirements of network Security • Policies, Standard, Procedures, Baselines,Guidelines • Security methods <ul style="list-style-type: none"> - Encryption, Cryptography, - Authentication • Security Principle –CIA Model • Basics of Internet • How internet is connect with computer • Technology related internet <ul style="list-style-type: none"> - Dial up tech. - ISDN network tech. - Lease line tech. • VPN <ul style="list-style-type: none"> - Types of VPN - Use of VPN - VPN protocols(PPTP, L2TP, IPsec.) • Proxy server, Firewall • GPS,GPRS • CCTV tech. 	20	12
TOTAL			100	60

Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.
TOTAL LECTURES 60+15=75

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Course outcomes:

- Understand various types of computer networks
- Enumerate the layers of the OSI model and TCP/IP
- Understand principles of LAN design such as topology and configuration
- Apply transmission media and various networking devices to establish networks
- Compare and Analyze various spread spectrum and multiplexing techniques
- Understand network industry trends such as: Routing Protocols, IP Addresses, Error Detection

Reference Books:

1. Networking Essential - Glenn Berg Tech. Media
2. MCSE Self-Paced Training Kit (Server 2003)
Data Communication and Networking - B A Forouzan

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CS - 14: C++ and Object Oriented Programming				
Objectives:				
<ul style="list-style-type: none"> • To provide of OOPs concepts, input/output data management, arrays in C++, functions, classes, objects, pointers, and much more. • Object-oriented features, which allow the programmer to create objects within the code. 				
Prerequisites:				
<ul style="list-style-type: none"> • The concepts of OOPs and their implementation 				
No	Topics	Details	Marks weight in %	App. Lect.
1	Principles of object oriented programming , Tokens, expressions and control statements	<ul style="list-style-type: none"> • Procedure – oriented programming • Object oriented programming paradigm • Basic concepts of object oriented Programming • Benefits of object oriented programming • Application of object oriented programming • What is c++? • Application of c++ • Input/output operators • Structure of c++ program • Introduction of namespace • Tokens : keywords, identifiers, basic data types, user- defined types, derived data types, symbolic constants, type compatibility, declaration of variables, dynamic initialization of variables, reference variables • Operators in C++: scope resolution operator, member referencing operator, memory management operator, manipulators, type cast operator. • Expression : Expression and their types, special assignment operator, implicit conversions, operator precedence • Control structures <ul style="list-style-type: none"> ◆ Conditional control structure :- simple if, if...else , nested if else, switch etc. 	20	11

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		♦ Looping control structure:- for, while , do...while		
2	Functions in C++ Classes and Objects	<ul style="list-style-type: none"> • The main function • Function prototype • Call by reference • Return by reference • Inline function • Default arguments • Const arguments • Functions overloading • Adding C Functions turbo C++ • C structures revisited • Specifying a class • Local Classes • Nested Clases • Defining member functions, nesting of Member functions, private member function, making outside function inline • Arrays within a class • Memory allocation for objects • Static data member • Static member functions • Arrays of objects • Objects as function arguments • Friendly functions • Returning objects • Const member function • Pointer to members 	20	13
3	Constructor and Destructor, Operator overloading and type conversion	<ul style="list-style-type: none"> • Characteristics of constructor • Explicit constructor • Parameterized constructor • Multiple constructor in a class • Constructor with default argument • Copy constructor • Dynamic initialization of objects • Constructing two dimensional array • Dynamic constructor • MIL , Advantage of MIL • Destructors • Concept of operator overloading 	20	11

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		<ul style="list-style-type: none"> • Overloading unary and binary operators • Overloading of operators using friend Function • Manipulation of string using operators • Rules for operator overloading • Type conversions. • Comparison of different method of conversion 		
4	Inheritance Pointer, Virtual functions, and Polymorphism, RTTI	<ul style="list-style-type: none"> • Defining derived classes • Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid) • Virtual base class & Abstract class • Constructors in derived class • Application of Constructor and Destructor in inheritance • Containership, Inheritance V/s Containership • Pointer to Object • Pointer to derived class • this pointer • Rules for virtual function • Virtual function and pure virtual function. • Default argument to virtual function • Run Time Type Identification 	20	10
5	Console I/O operations, Working with Files, Exception handling, Introduction to Template STL	<ul style="list-style-type: none"> • C++ streams • C++ stream classes • Unformatted and formatted I/O operations • Use of manipulators. • File stream classes • Opening and closing a file • Error handling • File modes • File pointers • Sequential I/O operations • Updating a file (Random access) • Command line arguments • Overview of Exception Handling 	20	15

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	<ul style="list-style-type: none"> • Need for Exception Handling • Various components of exception handling • Overview of Exception Handling • Introduction to templates • Class templates • Function templates • Member function templates • Overloading of template function • Non-type Template argument • Primary and Partial Specialization • Introduction to STL • Overview of iterators, containers 		
TOTAL		100	60

Students seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures

TOTAL LECTURES 60+15=75

Course outcomes:

- Understand the concept and underlying principles of Object-Oriented Programming.
- Understand implementation issues related to object-oriented techniques.
- Apply the techniques of object-oriented programming to solve real problems
- Analyze, apply and write programs that make appropriate use of object-oriented functionality such as classes, overloading and inheritance
- Implement the file handling techniques for back-end storage problems solutions

Reference Books:

1. Complete Reference C++ by Herbert Schildt McGraw Hill Publications
2. Computer Science- A Structured approach using C++ by Forouzan, Gilburg, THOMSON
3. Object Oriented Programming in C++ - E.Balagurusamy, BPB
4. Object Oriented programming in C++ by Robert Lafore, Pearson Education
5. Mastering C++ - Venugopal
6. The C++ Programming Language by Bjarne Stroustrup, Pearson Education
7. Object Oriented Programming in C++ - Robaret Laphore
8. Let us C++ - Yashvant Kanitkar, BPB

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CS – 15: RDBMS Using Oracle				
Objectives:				
<ul style="list-style-type: none"> • To provide the basic concept, theory and practices in design and implementation of DBMS. • To be able to handling different type of data transaction by using SQL commands. 				
Prerequisites:				
<ul style="list-style-type: none"> • Theoretical as well as practical knowledge of database management system. 				
No.	Topics	Details	Marks weight In %	Min Lect.
1	DBMS Overview, SQL, SQL*Plus	<ul style="list-style-type: none"> • Introduction to DBMS • Introduction to RDBMS • Dr.E.F.Codd Rules • Importance of E.R.Diagram in Relational DBMS. • Normalization • Introduction to SQL • SQL Commands and Datatypes • Introduction to SQL*Plus • SQL*Plus formatting commands • Operator and Expression • SQL v/s SQL*Plus 	20	8
2	Managing Tables and Data	<ul style="list-style-type: none"> • Creating , Altering & Dropping tables • Data Manipulation Command like • Insert, update, delete • Different type of constraints and applying of constraints • SELECT statement with WHERE, GROUP BY and HAVING,ROLLUP AND CUBE, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL, BETWEEN, EXISTS, LIKE • Join (Inner join ,outer join, self join) • subquery, minus, intersect, union • Built in functions 	20	10

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		<ul style="list-style-type: none"> • Numeric Function abs, ceil, cos, decode, exp, floor, greatest, least, log, log10, max, min, rem, round , sign, sin, sinh, sqrt, tan, trunc • Character Function chr, concat, initcap, lower, lpad, ltrim, replace, rpad, rtrim, soundex, substr, treat, trim, upper • Date Function add_months, last_day, months_between, next_day, round (date), sysdate, systimestamp, trunc (date), to_date, to_char • Aggregate function Sum, Count, AVG, MAX, MIN • General Functions COALESCE, CASE WHEN, DECODE 		
3	Other ORACLE Database Objects, Data Control And Transaction Control Command, Concurrency control using lock	<ul style="list-style-type: none"> • View • Sequence • Synonyms, • Database Links • Index <ul style="list-style-type: none"> ○ B*Tree Indexes ○ Bitmap Indexes ○ Function-Based Indexes ○ Application Domain Indexes • Cluster, • Snapshot • Creating user & role • Grant, Revoke command • What is transaction? • Starting and Ending of Transaction • Commit, Rollback, SavePoint • What Are Locks? • Locking Issues <ul style="list-style-type: none"> ○ Lost Updates ○ Pessimistic Locking ○ Optimistic Locking ○ Blocking ○ Deadlocks ○ Lock Escalation • Lock Types <ul style="list-style-type: none"> ○ DML Locks, DDL Locks, 	20	15

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		<ul style="list-style-type: none"> ○ Latches ○ Manual Locking and User-Defined Locks 		
4	Introduction to PL/SQL and Advanced PL/SQL	<ul style="list-style-type: none"> • SQL v/s PL/SQL • PL/SQL Block Structure • Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.) • %TYPE and %ROWTYPE • Using Cursor(Implicit, Explicit) • Exception Handling • Creating and Using Procedure, Functions, • Package, • Triggers • Creating Objects, • Object in Database-Table • PL/SQL Tables, Nested Tables, Varrays 	20	18
5	Oracle Database Structure and Storage, Database Resource Management and Task Scheduling	<ul style="list-style-type: none"> • Instance Architecture <ul style="list-style-type: none"> ○ Database Processes ○ Memory Structure. ○ Data files • Creating & Altering Database • Opening & shutdown Database • Initialization Parameter • Control Files, Redo Logs files • Tablespace (Create, Alter, Drop) • Rollback Segment (Create, Alter) (System & Transaction RBS) • Oracle Blocks • Import <ul style="list-style-type: none"> • Export • SQL*Loader • Managing Automated Database Maintenance Tasks • Managing Resources with Oracle Database Resource Manager • Oracle Scheduler Concepts • Scheduling Jobs with Oracle Scheduler • Administering Oracle Scheduler 	20	9
		Total	100	60

Students seminar - 5 Lectures.

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Expert Talk - 5 Lectures
 (Managing a Multitenant Environment using Oracle 12c)
Students Test - 5 Lectures
TOTAL LECTURES 60+15=75

Course outcomes:

- Describe the fundamentals of data design and relation database concepts
- Design entity-relationship diagrams to represent database application scenarios
- Develop relational database
- Apply normalization techniques on relational database
- Describe the knowledge of transaction processing and various concurrency problems
- Apply knowledge of SQL queries to perform various database related operations
- Develop various PL/SQL programs

Reference Books:

1. Oracle Database 12c The Complete Reference (Oracle Press) by Bob Bryla , Kevin Loney – Oracle Press
2. Oracle Database 12c SQL – Jason Price – Oracle Press
3. Oracle Database 12c PL/SQL Programming by McLaughlin – Oracle Press
4. SQL,PL/SQL The programming - Lang.Of Oracle Ivan Bayross - BPB

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CS – 16: Web development using Joomla: CMS				
<p>Objectives:</p> <ul style="list-style-type: none"> • Learn how to create custom themes and pages • Work with custom post types and taxonomies • In detail knowledge of the Joomla CMS backend • Working with widgets and widget areas. • Working in default cms functions and extending its core. <p>Prerequisites:</p> <ul style="list-style-type: none"> • Knowledge of web development, CMS and bootstrap 				
No.	Topic	Details	Marks weight In %	Min. Lect.
1	Object Oriented Programming and MVC Structure	<ul style="list-style-type: none"> - Advance Concept of OOP • Class • Properties • Class Constants • Autoloading Classes • Constructors and Destructors • Visibility • Object Inheritance • Scope Resolution Operator (::) • Static Keyword • Class Abstraction • Object Interfaces • Namespace • Interface • Traits • Anonymous classes • Overloading • Object Iteration • Magic Methods • Final Keyword • Object Cloning • Comparing Objects • Type Hinting • Late Static Bindings • Objects and references • Object Serialization 	20	12

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		- Mysql Database handling with pdo (insert, update, select, delete)		
2	Introduction	- What is Content Management System (CMS)? - Introduction of Joomla! [1] - Joomla! Core Features [2] - Advantages & Disadvantages of Joomla! CMS - Understand How Joomla! Works	20	12
	Installation & Configuration	- Technical Requirements for Joomla! [4] - Installation of Joomla! [5] - Joomla! Directory & file structure. - Dashboard overview - How to add, edit, delete, publish and batch process category and content. - User Manager, Groups and Access Levels. - Global Configurations (Site, System, Server, Permissions and Text Filters) - Joomla! Update <ul style="list-style-type: none"> ● Liver Update ● Upload & Update - Understanding Banners, Contacts, News Feed and Smart Search. - Database Structure		
3	Templates	- Understanding Joomla! templates [6] - Typical Template Directory Structure - Template directories - Example structure with files - Template files - XML Format - Basic Details - Folder Structure - Module Positions - Languages - Parameters	20	12

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	Component	<ul style="list-style-type: none"> - What is a Joomla! Component? [7] - Introduction to MVC (Model, View, Controller) - Understanding Joomla! Component Framework - Accessing a Joomla! Component - Joomla! MVC Basic Directory Structure 		
	Modules	<ul style="list-style-type: none"> - What is Joomla! Modules? [8] - How to install and Publish modules. - Understanding Module Positions. - Using core joomla! Modules. 		
	Plugins	<ul style="list-style-type: none"> - What is plugin? [9] - How to install and enable plugin. - Plugin Types (Authentication, Captcha, Content, Editors, Extensions, Finder, Quick Icons, System, User) - Plugin Events for each plugin type - Custom Plugin Types and Events 		
4	Basic Development Developing a MVC Component	<ul style="list-style-type: none"> - Introduction [10] [11] - Development of a Basic Component - Adding a view to the site part - Adding a menu type to the site part - Adding a model to the site part - Adding a variable request in the menu type - Using the database - Basic backend 	20	12
	Module	<ul style="list-style-type: none"> - Introduction [12] - File Structure - Creating mod_helloworld.php - Creating helper.php - Creating tmpl/default.php - Creating mod_helloworld.xml - Conclusion 		
	Developing			

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	Plugin	<ul style="list-style-type: none"> - Introduction [13] - File structure - Creating the Installation file - Creating the plugin - Using plugin in your code 		
	Developing Template	<ul style="list-style-type: none"> - Introduction [14] - Setting up a directory structure - Creating a basic templateDetails.xml file - Creating a basic index.php file - 1 Begin - 2 Head - 3 Body Section - 3.1 Module Positions - 4 End - 5 Custom Images - 6 Custom CSS - Testing the template - Packaging the template for installation - Conclusion 		
5	Advanced Development	<p>Advance Component Development [10] [11]</p> <ul style="list-style-type: none"> - Adding language management - Adding backend actions - Adding decorations to the backend - Adding verifications - Adding categories - Adding configuration - Adding ACL <p>Supporting plugins in your component [15]</p> <ul style="list-style-type: none"> - Background <ul style="list-style-type: none"> - Joomla! Observer Implementation - Why Become A Communicator - Implementation <ul style="list-style-type: none"> - How To Become A Communicator - How To Trigger Events - Caveats <ul style="list-style-type: none"> - You Are Defining An API - Load The Right Plugin Group 	20	12
	Joomla!			

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	Framework	<ul style="list-style-type: none"> - What is the Joomla! Framework? [16] - Get the Sample Application - Why build a Joomla! Framework? - What is the Framework good for? - Framework Architecture - What does the Joomla! Framework mean for you? - Why should I consider using the Joomla! Framework? - I know PHP already. Why should I use this framework? - As a Joomla! CMS User. How will I be affected? 		
	Joomla! 4 and Future	<ul style="list-style-type: none"> - What is Joomla! 4 [17] - Why the transformation in Joomla 4? - Improvements in Joomla admin workflow. - An evolution in Joomla code. - Orthogonal Component Structure. - Strict MVC Implementation. - Frontend and Backend Template Improvements using Bootstrap 4. - Joomla! 4 and Joomla! Framework. 		
TOTAL :			100	60

Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.
TOTAL LECTURES 60+15=75

Course outcomes:

- Work with and configure the cms backend
- Know when to use a custom post type or custom field
- Extend the Joomla cms core to match requirements
- Create stunning dynamic themes

References

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1. <https://www.joomla.org/about-joomla.html>
2. <https://www.joomla.org/core-features.html>
3. <https://docs.joomla.org/Portal:Beginners>
4. <https://downloads.joomla.org/technical-requirements>
5. https://docs.joomla.org/J3.x:Installing_Joomla
6. https://docs.joomla.org/Understanding_Joomla!_templates
7. https://docs.joomla.org/Absolute_Basics_of_How_a_Component_Functons#Joomla.21_Component_Framework_Explained
8. <https://docs.joomla.org/Module>
9. <https://docs.joomla.org/Plugin>
10. https://docs.joomla.org/J3.x:Developing_an_MVC_Component
11. <https://github.com/joomla-extensions/boilerplate>
12. https://docs.joomla.org/J3.x:Creating_a_simple_module/Developing_a_Basic_Module
13. https://docs.joomla.org/J3.x:Creating_a_Plugin_for_Joomla
14. https://docs.joomla.org/Creating_a_basic_Joomla!_template
15. https://docs.joomla.org/Supporting_plugins_in_your_component
16. <https://framework.joomla.org/>
17. <https://developer.joomla.org/news/620-joomla-4-working-group.html>

Training Videos for reference

<https://community.joomla.org/joomla-training.html>

Books

1. Joomla! 3 Beginner's Guide Second Edition by Eric Tiggeler - Year 2015
2. Programming Joomla Plugins by Jisse Reitsma - Year 2015
3. Joomla! 3 Template Essentials by Pawel Frankowski - Year 2015
4. Foundations of Joomla! by B. M. Harwani - Year 2015

Official Joomla! Books from Joomla! Press

1. Joomla!® 3 Explained: Your Step-by-Step Guide by Stephen Burge
2. The Official Joomla! Book (2nd Edition) by Jennifer Marriott
3. Joomla! Programming by Mark Dexter and Louis Landry
4. Joomla! Templates by Angie Radtke

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CS-17: Practical Based On CS – 14	
Topics	Marks
CS - 14	100

CS-18: Practical Based On CS – 15 & CS – 16	
Topics	Marks
CS – 15 and CS - 16	100

Note:

- Each session is of 3 hours for the purpose of practical examination.
- Practical examination may be arranged before or after theory examination.

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SR.NO	SUBJECT	NO. OF LECT. PER WEEK	CREDIT
1	CS – 19 Programming with JAVA	5	5
2	CS – 20 Programming with C#	5	5
3	CS – 21 SEARCH ENGINE TECHNIQUES AND DIGITAL TECHNOLOGY TRENDS	5	5
4	CS – 22 Operating Systems Concepts With Unix / Linux	5	5
5	CS – 23 Practical (Based On CS-19, CS-22)	5	5
6	CS – 24 Practical (Based On CS-20)	5	5
Total credit			30

Note:

1. Credit of each subject is 5. Total credit of semester is 30.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical paper are 100. No internal examination marks in practical papers.

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CS – 19 PROGRAMMING WITH JAVA				
<p>Objectives:</p> <ul style="list-style-type: none"> To provide fundamental concepts of Object Oriented Programming and familiar with Java environment and its applications. To be able to understand Control structures, Classes, methods and argument passing and iteration graphical user interface basics Programming and documentation style. <p>Prerequisites:</p> <ul style="list-style-type: none"> Basic knowledge of object-oriented approach in programming with basic skills using Java. 				
No	Topics	Details	Marks weight In %	Min Lec.
1	History, Introduction and Language Basics, Classes and Objects	<ul style="list-style-type: none"> History and Features of Java Java Editions JDK, JVM and JRE JDK Tools Compiling and Executing basic Java Program Java IDE (Netbeans and Eclipse) Data Type (Integer, Float, Character, Boolean) Java Tokens (Keyword, Literal, Identifier, Whitespace, Separators, Comments, Operators) Operators (Arithmetic, Relational, Boolean Logical, Bitwise Logical, Assignment, Unnary, Shift, Special operators) Java Keywords (assert, strictfp, enum) Type Casting Decision Statements (if, switch) Looping Statements (for, while, do..while) Jumping Statements (break, continue, return) Array (One Dim., Rectangular, Jagged) 	20	8

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		<ul style="list-style-type: none"> • Command Line Argument Array • OOP Concepts (Class, Object, Encapsulation, Inheritance, Polymorphism) • Creating and using Class with members • Constructor • finalize() method • Static and Non-Static Members • Overloading (Constructor & Method) • VarArgs • IIB (Instance Initialization Block) in Java 		
2	Inheritance, Java Packages	<ul style="list-style-type: none"> - Universal Class (Object Class) - Access Specifiers (public, private, protected, default, private protected) - Doing Inheritance - Constructors in inheritance - Method Overriding - Interface, Object Clonning - Nested and Inner Class - Abstract and Final Class - Normal import and Static Import - Introduction to Java API Packages and imp. Classes <ul style="list-style-type: none"> o java.lang o java.util o java.io o java.net o java.awt o java.awt.event o java.applet o java.swing - java.lang Package Classes (Math, Wrapper Classes, String, String Buffer) - java.util Package Classes (Random, Date, GregorianCalendar, Vector, HashTable, StringTokenizer, Collections in Java – Linked List, SortedSet, Stack, Queue, Map) - Creating and Using UserDefined package and sub-package 	20	15
3	Exception Handling	<ul style="list-style-type: none"> - Introduction to exception handling 	20	13

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	and Threading Streams (Input and Output)	<ul style="list-style-type: none"> - try, catch, finally, throw, throws - Creating user defined Exception class - Thread and its Life Cycle (Thread States) - Thread Class and its methods - Synchronization in Multiple Threads (Multithreading) - Daemon Thread, Non-Daemon Thread - Stream and its types (Input, Output, Character, Byte) - File and RandomAccessFile Class - Reading and Writing through Character Stream Classes (FileReader, BufferedReader, FileWriter, BufferedWriter) - Reading and Writing through Byte Stream Classes (InputStream, FileInputStream, BufferedInputStream, DataInputStream, OutputStream, FileOutputStream, BufferedOutputStream, DataOutputStream) - StreamTokenizer Class - Piped Streams, Bridge Classes : InputStreamReader and OutputStreamWriter - ObjectInputStream, ObjectOutputStream 		
4	Applets, Layout Managers	<ul style="list-style-type: none"> - Introduction to Applet - Applet Life Cycle - Implement & Executing Applet with Parameters - Graphics class - FlowLayout - BorderLayout - CardLayout - GridLayout - GridBagLayout with GridBagConstraints - Intro. to BoxLayout, SprigLayout, GroupLayout - Using NO LAYOUT Manager 	20	9
5	GUI using SWING, Event Handling	<ul style="list-style-type: none"> - Introduction to AWT and Swing - Difference Between AWT and Swing Components - Swing Components <ul style="list-style-type: none"> o JFrame, JPanel 	20	15

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		<ul style="list-style-type: none"> ○ JLabel, JButton, JRadioButton, JCheckBox, JProgressBar, JFileChooser, ○ JTextField, JPasswordField, JTextArea ○ JScrollBar, JComboBox, JList ○ Menus (JMenuBar, JMenu, JMenuitem) - Introduction to Event Handling - Event Delegation Model - Event Packages <ul style="list-style-type: none"> ○ AWT Event Package ○ Swing Event Package - Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, AdjustmentEvent, MouseWheelEvent, TextEvent, WindowEvent, etc.) - Listener Interfaces (ActionListener, ItemListener, FocusListener, AdjustmentListener, KeyListener, MouseListener, MouseMotionListener, TextListener, WindowListener, etc.) - Adapter Classes (FocusAdapter, KeyAdapter, MouseAdapter, MouseMotionAdapter) 		
		Total	100	60

Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.
TOTAL LECTURES 60+15=75

Course outcomes:

- Understand basic concepts and Java Programming Constructs
- Demonstrate Object Oriented Programming Concepts using JAVA
- Develop robust application by demonstrating professionally acceptable coding
- Design attractive user interface using AWT
- Apply parallel computations in solutions
- Develop programs to solve numeric and string-based problems

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Reference Books:

1. Java: A Beginner's Guide – Jul 2014 by Herbert Schildt
2. Java Programming (Oracle Press) by Poornachandra Sarang
3. Java The Complete Reference, 8th Edition –by Herbert Schildt
4. Ivor Horton's "Beginning Java 2" JDK 5 Edition, Wiley Computer Publishing.
5. Ken Arnold, James Gosling, David Holmes, "The Java Programming Language", Addison-Wesley Pearson Education.
6. Cay Horstmann, "Big Java", Wiley Computer publishing (2nd edition – 2006).
7. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, "The Java Language Specifications", Addison-Wesley Pearson Education (3rd edition) Download at <http://docs.oracle.com/javase/specs/>

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CS – 20 PROGRAMMING WITH C#				
Objectives:				
<ul style="list-style-type: none"> • Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application • Knowledge of .NET environments. 				
Prerequisites:				
<ul style="list-style-type: none"> • Programming in C # programming language. 				
No	Topics	Details	Marks weight In %	Min Lec.
1	.NET Framework And Visual Studio IDE, Language Basics	Introduction to .NET Framework Features / Advantages CLR, CTS and CLS BCL / FCL / Namespaces Assembly and MetaData JIT and types Managed Code and Unmanaged Code Introduction to .NET Framework and IDE versions Different components (windows) of IDE Types of Projects in IDE (Console, Windows, Web, Setup, etc.) Data Types (Value Type & Reference Type) Boxing and UnBoxing Operators (Arithmetic, Relational, Bitwise, etc.) Arrays (One Dimensional, Rectangular, Jagged) Decisions (If types and switch case) Loops (for, while, do..while, foreach)	20	11
2	Class and Inheritance Property, Indexer, Pointers, Delegates, Event, Collections	Concept of Class, Object, Encapsulation, Inheritance, Polymorphism Creating Class and Objects	20	15

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		<p>Methods with “ref” and “out” parameters Static and Non-Static Members Constructors Overloading Constructor, Method and Operator Inheritance Sealed Class & Abstract Class Overriding Methods Interface inheritance Creating and using Property Creating and using Indexer Creating and using Pointers (unsafe concept) Creating and using Delegates (Single / Multicasting) Creating and using Events with Event Delegate Collections (ArrayList, HashTable, Stack, Queue, SortedList) and their differences.</p>		
3	Windows Programming	<p>Creating windows Application MessageBox class with all types of Show() method Basic Introduction to Form and properties Concept of adding various Events with event parameters Different Windows Controls</p> <ul style="list-style-type: none"> - Button - Label - TextBox - RadioButton - CheckBox - ComboBox - ListBox - PictureBox - ScrollBar - TreeView - Menu (MenuStrip, ContextMenuStrip) - ToolStrip - Timer - Panel and GroupBox 	20	15

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		Dialog Boxes (ColorDialog, FontDialog, SaveFileDialog and OpenFileDialog) MDI Concept with MDI Notepad Concept of Inheriting Form		
4	Database Programming with ADO.NET	Concept of Connected and Disconnected Architecture Data Providers in ADO.NET Connection Object Connected Architecture <ul style="list-style-type: none"> - Command - DataReader Disconnected Architecture <ul style="list-style-type: none"> - DataAdapter - DataSet - DataTable - DataRow - DataColumn - DataRelation - DataView Data Binding GridView Programming	20	11
5	User Controls (Components), Crystal Reports, Setup Project	Creating User Control with <ul style="list-style-type: none"> - Property - Method - Event Using User Control in Windows Projects as component, Creating Crystal Reports Types of Reports Report Sections Formula, Special Field and Summary in Report Types of Setup Projects Creating Setup Project <ul style="list-style-type: none"> - File System Editor - User Interface Editor - Launch Conditions Editor 	20	8
		Total	100	60

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Students seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures
TOTAL LECTURES 60+15=75

Course outcomes:

- Use the Microsoft Visual Studio development environment to create a windows application
- Understand the basics of object-oriented programming, CLR and .NET framework
- Demonstrate C# programming constructs to solve given problem
- Perform CRUD operations in windows application
- Use the trace and debug utility that are provided with Visual Studio .NET
- Develop, configure and deploy windows application

Reference Books

1. Pro C# 5.0 and .NET 4.5 Framework (By: Andrew Troelsen)
2. Head First C# - (By: Jennifer Greene, Andrew Stellman)
3. C# 5.0 Unleashed - (By: Bart De Smet)
4. Adaptive Code Via C# (By: Gary McLean Hall)
5. C#.NET Programming Black Book - steven holzner –dreamtech publications
6. Introduction to .NET framework - Wrox publication
7. Microsoft ADO. Net - Rebecca M. Riordan, Microsoft Press

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**CS – 21 SEARCH ENGINE TECHNIQUES AND
DIGITAL TECHNOLOGY TRENDS**

Objectives:

- Understand basic of search engines and reflecting
- Understand SEO objectives and defining site audience.
- Apply and Implement SEO friendly website with all SEO concept.
- Understand keyword research and apply it for website developments.
- Understand the new trends of digital technologies.

Prerequisites:

- Basic knowledge of search engine, E-commerce and SEO .

No	Topics	Details	Marks weight In %	Min Lec.
1	The Search Engines: Reflecting Consciousness and Connecting Commerce Search Engine Basics	<ul style="list-style-type: none"> • The Mission of Search Engines • The Market Share of Search Engines • The Human Goals of Searching • Determining Searcher Intent: A Challenge for Both Marketers and Search Engines • How People Search? • How Search Engines Drive Commerce on the Web? • Eye Tracking: How Users Scan Results Pages? • Click Tracking: How Users Click on Results? Natural Versus Paid • Understanding Search Engine Results • Algorithm-Based Ranking Systems: Crawling, Indexing, and Ranking • Determining Searcher Intent and Delivering Relevant • Fresh Content • Analyzing Ranking Factors • Using Advanced Search Techniques • Vertical Search Engines • Country-Specific Search Engines 	20	12

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2	Determining SEO Objectives and Defining Site's Audience First Stages of SEO	<ul style="list-style-type: none"> • Setting SEO Goals and Objectives • Developing an SEO Plan Prior to Site • Development Understanding Audience and Finding Niche • SEO for Raw Traffic • SEO for E-Commerce Sales • SEO for Mindshare/Branding • SEO for Lead Generation and Direct Marketing • SEO for Reputation Management • SEO for Ideological Influence • The Major Elements of Planning • Identifying the Site Development Process and Players • Defining Site's Information Architecture • Auditing an Existing Site to Identify SEO Problems • Identifying Current Server Statistics Software and Gaining Access • Determining Top Competitors • Assessing Historical Progress • Benchmarking Current Indexing Status • Benchmarking Current Rankings • Benchmarking Current Traffic Sources and Volume • Leveraging Business Assets for SEO • Combining Business Assets and Historical Data to Conduct SEO/Website SWOT Analysis 	20	12
3	Developing an SEO-Friendly Website	<ul style="list-style-type: none"> • Making Site Accessible to Search Engines • Creating an Optimal Information Architecture • Root Domains, Subdomains, and Microsites • Optimization of Domain Names/URLs <ul style="list-style-type: none"> • Keyword Targeting 	20	12

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		<ul style="list-style-type: none"> • Content Optimization • Duplicate Content Issues Controlling • Content with Cookies and Session IDs • Content Delivery and Search Spider Control • Redirects, Content Management System (CMS) Issues • Optimizing Flash • Best Practices for Multilanguage/Country Targeting 		
4	Keyword Research, Optimizing for Vertical Search	<ul style="list-style-type: none"> • The Theory Behind Keyword Research Traditional Approaches: Domain Expertise • Site Content Analysis • Keyword Research Tools • Determining Keyword Value / Potential • ROI, Leveraging the Long Tail of Keyword Demand, Trending, Seasonality, and Seasonal Fluctuations in Keyword Demand • The Opportunities in Vertical Search • Optimizing for Local Search • Optimizing for Image Search • Optimizing for Product Search • Optimizing for News, Blog, and Feed • Search Others: Mobile, Video/Multimedia Search 	20	12
5	Digital Technology Trends	<ul style="list-style-type: none"> • Digital Business <ul style="list-style-type: none"> ○ Introduction to digital business, ○ Difference between digital business and ecommerce, ○ Digital business opportunities, ○ Risk and barriers to digital business adoption • Block Chain Technology 	20	12

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		<ul style="list-style-type: none"> ○ Tracing blockchain origin, ○ Blockchain feature, ○ How BlockChain Work? <ul style="list-style-type: none"> ● Virtual Reality, Augmented Reality(AR): <ul style="list-style-type: none"> ○ Introduction to Virtual Reality (VR), ○ Needs of VR ○ Introduction and brief history of AR ○ Difference between AR and VR ○ Opportunities for augmented reality 		
		Total	100	60

Students seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures
TOTAL LECTURES 60+15=75

Course outcomes:

- Understand the main elements that help a website rank organically and in the paid search space in Google.
- Learn how to perform keyword research using Google's free tools.
- Learn how to develop landing pages that are search engine friendly.
- Learn how to carry out inbound linking practices.

Reference Books:

1. Networking Essential - Glenn Berg Tech. Media
2. MCSE Self-Paced Training Kit (Server 2003)
3. Data Communication and Networking - B A Forouzan
4. Networking Essential – Glenn Berg Tech. Media
5. MCSE Self-Paced Training Kit (Server 2003)
6. Data Communication and Networking – B A Forouzan

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CS – 22 : Operating Systems Concepts With Unix / Linux				
Objectives:				
<ul style="list-style-type: none"> • To provide the basic feature, function and interface with the hardware and application software to run the computer smoothly. 				
Prerequisites:				
Basic knowledge of operating system and it's functionality.				
Sr. No	Topic	Details	Marks in Weight %	Min. Lec.
1	Introduction, Process and Thread, Process Scheduling	<ul style="list-style-type: none"> • Meaning of OS • Functions of OS • Features of OS • OS Types (User Point of View) • OS Types (Features Point of View) <hr/> <ul style="list-style-type: none"> • Process Definition , • Processstates , • Process State transitions , • Process Control Block , • Context switching , <ul style="list-style-type: none"> • Threads, • Concept of multithreads , • Benefits of threads, • Types of threads. <hr/> <ul style="list-style-type: none"> • Types of Schedulers • CPU scheduling algorithms <ul style="list-style-type: none"> ○ FCFS ○ SJN ○ Round Robin ○ Priority Base Non Preemptive ○ Priority Base Preemptive 	20	18

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2	Deadlocks Memory management	<ul style="list-style-type: none"> • Deadlocks: Definition, • Deadlock Prevention • Deadlock Avoidance • Deadlock Detection 	20	12
		<ul style="list-style-type: none"> • Physical Memory and Virtual Memory • Memory Allocation • Internal and External fragmentation • Contiguous Memory Allocation • Noncontiguous Memory Allocation • Virtual Memory Using Paging • Virtual Memory Using Segmentation 		
3	Getting Started with Unix Unix Shell Command	<ul style="list-style-type: none"> • Unix Architecture • Unix Features • Types Of Shell (C, Bourn, Korn) • Unix File System • Types Of Files <ul style="list-style-type: none"> o Ordinary Files o Directory Files o Device Files • Unix File & Directory Permissions 	20	15
		<ul style="list-style-type: none"> • Connecting Unix Shell : Telnet • Login Commands <ul style="list-style-type: none"> o passwd, logout, who, who am i, clear,uname • File / Directory Related Command <ul style="list-style-type: none"> o ls, cat, cd, pwd, mv, cp, ln, rm, rmdir, mkdir, chmod, chown, chgrp, find,more,less,head,tail,wc,touch, stat, alias,type • Operators in Redirection & Piping <ul style="list-style-type: none"> o <, >, <<, >>, • Finding Patterns in Files <ul style="list-style-type: none"> o grep,fgrep,egrep • Working with columns and fields <ul style="list-style-type: none"> o cut,paste,join 		

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		<ul style="list-style-type: none"> • Tools for sorting :sort,uniq • Comparing files : cmp,comm,diff • Changing Information in Files : tr,sed, • Examining File Contents : od • Tools for mathematical calculations: bc,factor • Monitoring Input and Output :tee,script • Tools For Displaying Date and Time : cal,date • Communications : telnet,wall,write,mail,finger,mesg, ping • Process Related Commands : • ps, command to run process in background, nice,kill,at,batch,wait,sleep,top,jobs • Concept of Mounting a File System : mount command • Concept of DeMounting a File System : umount command 		
4	Text Editing With vi and nano Editor, Shell Programming	<ul style="list-style-type: none"> • Introduction of vi editor • Modes in vi • Switching mode in vi • Cursor movement • Screen control commands • Entering text, cut, copy, paste in vi editor • Introduction of nano editor 	20	08
		<ul style="list-style-type: none"> • Shell Keywords • Shell Variables • System variables <ul style="list-style-type: none"> ○ PS2, PATH, HOME,LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK • User variables <ul style="list-style-type: none"> ○ set, unset and echo command with shell variables • Positional Parameters • Interactive shell script using read and echo • Decision Statements <ul style="list-style-type: none"> ○ if then fi 		

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		<ul style="list-style-type: none"> ○ if then else fi ○ if then elif else fi ○ case esac ● test command ● Logical Operators ● Looping statements <ul style="list-style-type: none"> ○ for loop ○ while loop ○ until loop ○ break, continue command ● Array ● Function ● Various shell script examples 		
5	Getting Started with Linux, Linux Booting, Linux Admin (Ubuntu)	<ul style="list-style-type: none"> ● History of Linux ● GNU, GPL Concept ● Open Source & Freeware ● Structure and Features of Linux ● Installation and Configuration of Linux <ul style="list-style-type: none"> ○ Using with Ubuntu ● Startup, Shutdown and boot loaders of Linux <hr/> <ul style="list-style-type: none"> ● Linux Booting Process <ul style="list-style-type: none"> ○ LILO Configuration ○ GRUB Configuration <hr/> <ul style="list-style-type: none"> ● Creating Linux User Account and Password ● Installing and Managing Samba Server ● Installing and Managing Apache Server ● Optimizing LDAP Services ● Optimizing DNS Services ● Optimizing FTP Services ● Optimizing Web Services ● Configure Ubuntu's Built-In Firewall ● Working with WINE 	20	07

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Students seminar - 5 Lectures.
Expert Talk - 5 Lectures
Students Test - 5 Lectures.

TOTAL LECTURES 60+15=75

Course outcomes:

- Understand design and implementation aspects of modern operating system
- Acquire knowledge of four major OS components: process management, memory management, file systems, and input/output mechanisms
- Analyze and Compare various process scheduling algorithms
- Learn the concepts, design, and structure of the UNIX operating system
- Design Shell scripts using various UNIX utilities

Reference Books

1. Operating System Concept , Abraham Silberschatz, Peter B. Galvineg Gagne, Wiley-Indian Edition, 9th Edition
2. Operating Systems, Internals And Design Principles , William Stallings, Seventh Edition
3. Unix Shell Programming - Y. Kanetkar- Bpb Publications
4. Unix Concepts And Applications- Sumitabha Das
5. The complete reference Linux, Richard Petersen, McGraw Hill, Sixth Edition.

Hands-On (Not to be asked in the examination)

- ◆ Installation of Unix / Linux
- ◆ User and Group Creation
- ◆ Demo of Various Applications available in Unix / Linux like Star Office, Games and other productivity tools.
- ◆ Demo of GNOME, KDE Desktops in Linux.

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CS - 23 : Practical based on CS – 19 & CS – 22	
Topics	Marks
CS – 19 and CS - 22	100

CS - 24 : Practical Based on CS –20 & CS – 21	
Topics	Marks
CS – 20 and CS – 21	100

Note:

- **Each session is of 3 hours for the purpose of practical examination.**
- **Practical examination may be arranged before or after theory examination.**