SAURASHTRA UNIVERSITY

RAJKOT – INDIA

CURRICULAM

FOR

B.C.A.

Bachelor of Computer Application

(Semester - 3 and Semester - 4)

Effective From June – 2023

Bachelor of Computer Application
(Semester – 3 and Semester - 4)
Saurashtra University
Effective from June - 2023

B.C.A. (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 Word Press	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 Credits			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.

CS – 21 NETWORK TECHNOLOGY AND ADMINISTRATION

Objectives:

- 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.

Prerequisites:

- Basic knowledge of computer networking.

No	Topics	Details	Marks weight In %	Min Lec.
1	**Basics of Network, Network Models and LAN Sharing**	• Network concepts - What is network? - Use of network • Network model - peer – to – peer, - client – server • Network Services - File service, - Print service, - Comm. service, - Data base service, - Security service, - Application service • Network Access Methods - CSMA / CD, CSMA / CA, - Token passing - Polling • Network Topologies - Bus, Ring, Star, Mesh, Tree, Hybrid • Advanced Network Topologies Ethernet, CDDI, FDDI • Communication Methods - Unicasting - Multicasting - Broadcasting • OSI reference model with 7 layers • TCP/IP network model with 4 layers • File And Print Sharing in LAN. • Mapping of network drive • Disk quota • Encryption • Compression • Net meeting	20	12

2	**Transmission Media Multiplexing & Switching Concepts Network devices**	• Transmission Media - Types of Transmission media - Guided media - Co – Axial Cable, - Twisted Pair Cable, - Crimping of Twisted pair cable - Fiber Optic Cable • Unguided media - Infrared, Laser, Radio, Microwave, Bluetooth tech. • Different Frequency Ranges • Multiplexing & De-multiplexing • Multiplexing Types - FDM, - TDM, - CDM, - WDM • Switching Tech. - Circuit Switching, - Message Switching, - Packet Switching • CABLE NETWORK DEVICES • LAYER1 DEVICES - LAN CARD, - MODEM , - DSL & ADSL - HUB(Active, Passive, Smart hub) - REPEATER • LAYER2 DEVICES - SWITCH(Manageable, non-manageable) - BRIDGE(Source route, Transactional) • LAYER3 DEVICES - ROUTER - LAYER3 SWITCH - BROUTER - GATEWAY - Network Printer • WIRELESS NETWORK DEVICES Wireless switch Wireless router, ACCESSPOINT	20	15
3	**Network Protocols, Network Routing**	• Packets &Protocols • Conn. Oriented protocols -TCP& connection less protocols-UDP	20	10

		• TCP/IP STACK - HTTP, - FTP, - SMTP, - POP3 - SNMP, - TELNET, - ARP - RARP • IPX/SPX • AppleTalk, • NetBIOS Name PROTOCOL • L2CAP, RFCOMM Protocol • What is routing • Requirements of routing • Types of Routing - static, - dynamic, - default • Routing protocols - Exterior Routing protocol 1)BGP - Interior Routing protocol (1)Distance vector routing - RIP - IGRP - EIGRP (2)Link state routing - OSPF - IS IS		
4	**IP ADDRESSING, Windows 2008 server**	• What is ip address? • Types of ip address • ipv4 - Class structure - subneting, supernetting • ipv6 - Basic structure of ipv6 - Implementation of ipv6 • Migration from ipv4 to ipv6 • Installation of 2008 enterprise server • Various editions of windows 2008 server • Installation & Configuration of Active Directory - Domains, Trees, Forests concept • Accounts(User, Group, Computer)	20	11

		• Policy (Security and audit) • Logging Events • MMC(Microsoft Management console)		
5	**Basics of Network Security, Internet connection & Sharing**	• Fundamental of Network Security • Requirements of network Security • Policies, Standard, Procedures, Baselines, Guide lines • Security methods - Encryption, Cryptography - Authentication • Security Principle –CIA Model • Basics of Internet • How internet is connecting with computer • Technology related internet - Dial up tech. - ISDN network tech. - Lease line tech. • VPN - 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

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

CS - 14 : C++ and Object Oriented Programming

Objectives:

- 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:

concepts of OOPs and their implementation.

No	Topics	Details	Marks weight in %	Min. Lect.
1	**Principles of object oriented programming Tokens, expressions and control statements**	• 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	20	15

		• Control structures ♦ Conditional control structure :- simple if, if…else , nested if else, switch etc. ♦ Looping control structure:- for, while , do…while		
	Functions in C++	• The main function • Function prototype • Call by reference • Return by reference • Inline function • Default arguments • Const arguments • Functions overloading • Adding C Functions turbo C++		
2	**Classes and Objects, Constructor and Destructor**	• C structures revisited • Specifying a class • Local Classes • Nested Classes • 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	12
		• 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		
3	**Operator overloading and type conversion, Inheritance**	• Concept of operator overloading • Over loading 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 • 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	20	11
4	**Pointer, Virtual functions and Polymorphism, RTTI Console I/O operations**	• 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 • C++ streams • C++ stream classes • Unformatted and formatted I/O operations • Use of manipulators.	20	10
5	**Working with Files, Exception handling,**	• File stream classes • Opening and closing a file • Error handling • File modes	20	12

	Introduction to Template STL	• File pointers • Sequential I/O operations • Updating a file (Random access) • Command line arguments • Overview of Exception Handling • Need for Exception Handling • various components 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 Programmin in C++ - Robaret Laphore
8. Let us C++ - Yashvant Kanitkar, BPB

CS – 15 : RDBMS Using Oracle

Objectives:

- 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:

- Theoretical as well as practical knowledge of database management system.

No.	Topics	Details	Marks weight In %	Min Lect.
1	**DBMS Overview, SQL, SQL*Plus**	• 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	10
2	**Managing Tables and Data, Data Control And Transaction Control Command**	• Creating , Altering & Dropping tables • Data Manipulation Command like • Insert, update, delete • Different type of constraints and applying of constration • 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	15

		• 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 • Creating user & role • Grant, Revoke command • What is transaction? • Starting and Ending of Transaction Commit, Rollback, SavePoint		
3	**Other ORACLE Database Objects, Concurrency control using lock**	• View • Sequence • Synonyms, • Database Links • Index ○ B*Tree Indexes ○ Bitmap Indexes ○ Function-Based Indexes ○ Application Domain Indexes • Cluster • Snapshot • What Are Locks? • Locking Issues ○ Lost Updates ○ Pessimistic Locking ○ Optimistic Locking ○ Blocking ○ Deadlocks ○ Lock Escalation • Lock Types ○ DML Locks ○ DDL Locks ○ Latches ○ Manual Locking & User-Defined Locks	20	10

4	**Introduction to PL/SQL, Advanced PL/SQL**	• 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	15

5	**Oracle Database Structure and Storage Database, Resource Management and Task Scheduling**	• Instance Architecture
		  ○ 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
		• 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	10

	Total		100	60

Students seminar - 5 Lectures
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

CS – 16: Content Management System using WordPress

Objectives:

- Learn how to create custom themes and pages
- Work with custom post types and taxonomies
- In detail knowledge of the Wordpress CMS backend
- Working with widgets and widget areas.
- Working in default cms functions and extending its core.

Prerequisites:

- Basic knowledge of web development and CMS.

No.	Topic	Details	Marks weight In %	Min. Lect.
1	**Introduction Installation & Configuration**	What is Content Management System (CMS)? - Introduction of Wordpress - Features of Wordpress • Advantages & Disadvantages of Wordpress - Installation of Wordpress. - Wordpress Directory & file structure. - Dashboard overview - How to add, edit and delete page, category, post, tag. - Add new media file (image, pdf, doc etc.) & attach to post or page. - Gutenberg Introduction • Gutenberg Blocks (Paragraph, Heading, Subheading, Quote, Image, Cover Image, Gallery, Video, Audio, Columns, Code, List, Button, Embeds) - User Roles and Capabilities. - Setting (General, writing, Reading, Discussion, Media, Permalinks) - Updating Wordpress • One-click Update • Manual Update - Database Structure	15	9
2	**Theme**	- What is theme? - How to install & activate theme. - Theme Customize Options (Site Identity,	25	15

		Menus, Widgets, HomePage Settings, Additional CSS)		
3	**Widget**	- What is widget & widget Areas? - Widget Management • Available Widgets (Archive, Calendar, Categories, Navigation Menu, Meta, Pages, Recent Comments, Recent Posts, RSS, Search, Tag Cloud, Text, Image, Gallery, Video, Audio, Custom HTML) • Inactive Sidebar (not used) • Inactive Widgets	15	10
	Plugin	- What is plugin? - How to install and activate plugin. - Useful plugins for website. • Seo yoast • Contact form 7 • Woocommerce • WP Super Cache • Regenerate Thumbnails • Advanced Custom Fields • All-in-One WP Migration • Custom Post Type Widgets		
3	**Theme development**	- Anatomy of a Theme: header.php, footer.php and sidebar.php - Template Files (style.css, index.php, page.php, home.php, archive.php, single.php, comments.php, search.php, attachment.php, 404.php, category.php, tag.php, author.php, date.php) - The Loop (have_posts (), the_post()) - Template Tags 1. General tags (wp_head(), get_footer(), get_header(), get_sidebar(), get_search_form(), bloginfo(), wp_title(), single_post_title(), wp_footer(), comments_template(), add_theme_support(), get_template_directory_uri(),	30	14

		body_class()) 2. Author tags (the_author(), get_the_author(), the_author_link(), get_the_author_link(), the_author_meta(), the_author_posts()) 3 Category tags (category_description(), single_cat_title(), the_category()) 4. Link tags (the_permalink(), get_permalink(), home_url(), get_home_url(), site_url(), get_site_url()) 5 Post tags (the_content(), the_excerpt(), the_ID(), the_tags(), the_title(), get_the_title(), the_date(), get_the_date(), the_time(), next_post_link(), previous_post_link(), posts_nav_link(), post_class()) 6 Post Thumbnail tags (has_post_thumbnail(), get_post_thumbnail_id(), the_post_thumbnail(), get_the_post_thumbnail()) 7 Navigation Menu tags (wp_nav_menu()) 8 Conditional Tags (is_archive(), is_category(), is_front_page(), is_home(), is_page(), is_single(), is_search(), is_attachment(), is_active_sidebar()) - functions.php file		
4	**Advanced development**	- Advanced functions • add_action() • add_filter() • add_shortcode() • do_shortcode() • register_nav_menu()	15	12

		- Custom Post Types • register_post_type() • register_taxonomy() • Display custom Post Type & Taxonomy - Widget Area • register_sidebar() • dynamic_sidebar() •		
		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 Wordpress cms core to match requirements
- Create stunning dynamic themes

Reference Books:

1. Build Your Own Wordpress Website: An Ultimate Guide for Small Business Owners Paperback by Wordpress Genie
2. Teach Yourself VISUALLY Word Press Paperback –by George Plumley 3rd Edition.
3. Wordpress for Beginners: A Visual Step-by-step Guide to Mastering Word press Paperback –by Dr. Andy Williams.
4. Wordpress to Go: How to Build a Wordpress Website on Your Own Domain, from Scratch, Even If You Are a Complete Beginner Paperback –by Sarah Mcharry (Author)

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

Note : Each session is of 3 hours for the purpose of practical examination.

CS-18 : Practical And Viva 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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B.C.A. (Semester – 4)			
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** Web Searching Technology and Optimization	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, CS-21)	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.

CS – 19 PROGRAMMING WITH JAVA

Objectives:

- 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.

Prerequisites:

- 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**	- 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, Unary, 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) - Command Line Argument Array	**20**	**10**
		- 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**	- Universal Class (Object Class)
		- Access Specifiers (public, private, protected, default, private protected)
		- Constructors in inheritance
		- Method Overriding
		- Interface, Object Cloning,
		- Nested and Inner Class
		- Abstract and Final Class
		- Normal import and Static Import
		- Introduction to Java API Packages and imp. Classes
		  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, StringTokenizer, Collection in Java - Vector, HashTable, LinkedList, SortedSet, Stack, Queue, Map
		- Creating and Using UserDefined package and sub-package
			20	**15**

3	**Exception Handling, Threading and Streams (Input and Output)**	- Introduction to exception handling - try, catch, finally, throw, throws - Creating user defined Exception class - Thread and its Life Cycle (Thread States)	**20**	**10**

		- Thread Class and its methods - Synchronization in Multiple Threads (Multithreading) - Deamon Thread, Non-Deamon 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, DataInputStream, OutputStream, FileOutputStream, DataOutputStream) - StreamTokenizer Class - Piped Streams, Bridge Classes : InputStreamReader and OutputStreamWriter - ObjectInputStream, ObjectOutputStream		
4	**Applets**	- Introduction to Applet - Applet Life Cycle - Implement & Executing Applet with Parameters - Graphics class	**20**	**10**
	Layout Managers	- FlowLayout - BorderLayout - CardLayout - GridLayout - GridBagLayout with GridBagConstraints - Intro. to BoxLayout, SpringLayout, GroupLayout - Using NO LAYOUT Manager		
5	**GUI using SWING Event Handling**	- Introduction to AWT and Swing - Difference Between AWT and Swing Components	**20**	**15**

		- Swing Components o JFrame, JPanel o JLabel, JButton, JRadioButton, JCheckBox, JProgressBar, JFileChooser o JTextField, JPasswordField, JTextArea o JScrollBar, JComboBox, JList o Menus (JMenuBar, JMenu, JMenuItem) - Introduction to Event Handling - Event Delegation Model - Event Packages o AWT Event Package o Swing Event Package - Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, MouseWheelEvent, AdjustmentEvent TextEvent, WindowEvent, etc.) - Listener Interfaces (ActionListener, ItemListener, FocusListener, AdjustmentListener, KeyListener, MouseListener, MoutMotionListener, TextListener, WindowListener, etc.) - Adapter Classes (FocusAdapter, KeyAdapter, MouseAdapter, MouseMotionAdapter		
		Total	**100**	**60**

Student's 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

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 Langauge Specifications", Addison-Wesley Pearson Education (3rd edition) Download at http://docs.oracle.com/javase/specs/

CS – 20 PROGRAMMING WITH C#				
Objectives: • Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application. **Prerequisites**: • Basic Knowledge of C # programming language and .NET environment.				
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**	**10**
2	**Class and Inheritance, Property, Indexer, Pointers, Delegates, Event, Collections**	Concept of Class, Object, Encapsulation, Inheritance, Polymorphism Creating Class and Objects Methods with “ref” and “out” parameters Static and Non-Static Members Constructors	**20**	**15**

		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.		
3	**Windows Programming**	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 - Button - Label - TextBox - RadioButton - CheckBox - ComboBox - ListBox - PictureBox - ScrollBar - TreeView - Menu (MenuStrip, ContextMenuStrip) - ToopStrip - Timer - Panel and GroupBox Dialog Boxes (ColorDialog, FontDialog, SaveFileDialog and OpenFileDialog) MDI Concept with MDI Notepad	**20**	**15**

		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 - Command - DataReader Disconnected Architecture - DataAdapter - DataSet - DataTable - DataRow - DataColumn - DataRelation - DataView Data Binding GridView Programming	**20**	**12**
5	**User Controls (Components), Crystal Reports, Setup Project**	Creating User Control with - 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 - File System Editor - User Interface Editor - Launch Conditions Editor	**20**	**8**
		Total	**100**	**60**

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

CS – 21 WEB SEARCHING TECHNOLOGY AND OPTIMIZATION

Objectives:

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

Prerequisites:

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

No	Topics	Details	Marks weight In %	Min Lec.
1	**The Search Engines: Reflecting Consciousness and Connecting Commerce Search Engine Basics**	• 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**

2	**Determining SEO Objectives and Defining Site's Audience First Stages of SEO**	• 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**	• Making Site Accessible to Search Engines • Creating an Optimal Information Architecture • Root Domains, Subdomains, and Microsites • Optimization of Domain Names/URLs • Keyword Targeting	**20**	**12**

		• 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**	• 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	**Tracking Results and Measuring Success An Evolving Art Form: The Future of SEO**	• Why Measuring Success Is Essential to the SEO Process • Measuring Search Traffic • Tying SEO to Conversion and ROI • Competitive and Diagnostic Search Metrics Key Performance • Indicators for Long Tail SEO	**20**	**12**

		• The Ongoing Evolution of Search • More Searchable Content and Content Types, Search becoming More Personalized and User-Influenced • Increasing Importance of Local, Mobile, and Voice • Recognition Search • Increased Market Saturation and Competition • SEO As an Enduring Art Form		
		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) The Art of SEO : Mastering Search Engine Optimization By Eric Enge, Stephan Spencer, Rand
Fishkin, Jessie C Stricchiola, O'Reilly Media, 3rd Edition October, 2015
(2) Google SEO Bible, Beginner's Guide to SEO, ISBN-978-1700098733, moaml mohmmed, 2019
(3) SEO Warrior: Essential Techniques for Increasing Web Visibility By John I Jerkovic, O'Reilly Media, November, 2009

CS – 22 : Operating Systems Concepts With Unix / Linux

Objectives:

- 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 along with its types.

Sr. No	Topic	Details	Marks in Weight %	Min. Lec.
1	**Introduction,** **Process and Thread,** **Process Scheduling**	• Meaning of OS • Functions of OS • Features of OS • OS Types (User Point of View) • OS Types (Features Point of View)	**20**	**18**
		• Process Definition , • Processstates , • Process State transitions , • Process Control Block , • Context switching , • Threads, • Concept of multithreads , • Benefits of threads, • Types of threads.		

		• Types of Schedulers
		• CPU scheduling algorithms
		  ○ FCFS
		  ○ SJN
		  ○ Round Robin
		  ○ Priority Base Non Preemptive
		  ○ Priority Base Preemptive		

2	**Deadlocks** **Memory management**	• Deadlocks: Definition, • Deadlock Prevention • Deadlock Avoidance • Deadlock Detection	**20**	**12**
		• 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**	• Unix Architecture • Unix Features • Types Of Shell (C, Bourn, Korn) • Unix File System • Types Of Files o Ordinary Files o Directory Files o Device Files • Unix File & Directory Permissions	**20**	**15**
		• Connecting Unix Shell : Telnet • Login Commands o passwd, logout, who, who am i, clear,uname • File / Directory Related Command 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 o <, >, <<, >>, | • Finding Patterns in Files o grep,fgrep,egrep • Working with columns and fields o cut,paste,join		

		• 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 • Co • mmunications : 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**	• 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**

		• Shell Keywords
		• Shell Variables
		• System variables
		  ○ PS2, PATH, HOME,LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK
		• User variables
		  ○ set, unset and echo command with shell variables
		• Positional Parameters
		• Interactive shell script using read and echo
		• Decision Statements
		  ○ if then fi
		  ○ if then else fi		

		○ if then elif else fi ○ case esac • test command • Logical Operators • Looping statements o for loop o while loop o until loop o break, continue command • Array • Function • Various shell script examples		
5	**Getting Started with Linux, Linux Booting, Linux Admin (Ubuntu)**	• History of Linux • GNU, GPL Concept • Open Source & Freeware • Structure and Features of Linux • Installation and Configuration of Linux ○ Using with Ubuntu • Startup, Shutdown and boot loaders of Linux	**20**	**07**
		• Linux Booting Process ○ LILO Configuration ○ GRUB Configuration		
		• 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		

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.

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.**