Bachelor of Computer Application
(Semester – III and Semester - IV)
Saurashtra University
Effective from June - 2020

B.C.A. (Semester – IV)			
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** Network Technology and Administration	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.

CS – 19 PROGRAMMING WITH 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 - 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	**20**	**10**

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) - Thread Class and its methods - Synchronization in Multiple Threads (Multithreading) - Deamon Thread, Non-Deamon Thread	**20**	**10**
		- 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 - 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	**20**	**15**
		Total	**100**	**60**

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

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#				
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 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.	**20**	**15**
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	**20**	**15**

		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 - 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**

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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 NETWORK TECHNOLOGY AND ADMINISTRATION				
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 • AdvancedNetwork 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. • aping 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 & Demultiplexing • 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, nonmanagable) - 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 • 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	20	10

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) • Policy (Security and audit) • Logging Events • MMC(Microsoft Management console)	20	11

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

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

CS – 22 : Operating Systems Concepts With Unix / Linux				
No	**Topics**	**Details**	**Marks weight In %**	**App. Lect**
1	**Introduction, Process Management, Memory Management**	• Meaning of OS • Functions of OS • Features of OS • OS Types (User Point of View) • OS Types (Features Point of View)	20	12

		• Introduction of OS process
		• Process State Transition Diagram
		• Process Scheduling
		  ○ FCFS
		  ○ SJN
		  ○ Round Robin
		  ○ Priority Base Non Preemptive
		  ○ Priority Base Preemptive		

		• Physical Memory and Virtual Memory • Memory Allocation • Contiguous Memory Allocation • Noncontiguous Memory Allocation • Virtual Memory Using Paging • Virtual Memory Using Segmentation		

2	**Getting Started with Unix, Unix Shell Command, Text Editing With vi Editor,**	• Unix Architecture
		• Unix Features
		• Types Of Shell (C, Bourn, Korn)
		• Unix File System
		• Types Of Files
		  ○ Ordinary Files
		  ○ Directory Files
		  ○ Device Files
		• Unix File & Directory Permissions
			20	17

		• Connecting Unix Shell : Telnet
		• Login Commands passwd, logout, who, who am i, clear
		• File / Directory Related Command ls, cat, cd, pwd, mv, cp, ln, rm, rmdir, mkdir, umask, chmod, chown, chgrp, find,pg,more,less,head,tail,wc,touch
		• Operators in Redirection & Piping
		  ○ <
		  ○ >>>> ○ |		

		• Advance Tools • Finding Patterns in Files grep,fgrep,egrep • Working with columns and fields 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 • Communications telnet,wall,mtod,write,mail,news,finger • Process Related Commands : ps, command to run process in background, nice,kill,at,batch,cron, crontab,wait,sleep • Concept of Mounting a File System mount command • Concept of DeMounting a File System umount command • Introduction of vi editor • Modes in vi • Switching mode in vi • Cursor movement • Screen control commands Entering text, cut, copy, paste in vi editor		

3	**Shell Programming Getting Started with Linux, Linux Booting**	• 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 o if then fi o if then else fi o if then elif else fi o case esac • test command • Logical Operators • Looping statements o for loop o while loop o until loop o break, continue command • Arithmetic in Shell script • Various shell script examples	20	16
		• 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		
		• Linux Booting Process - LILO Configuration - GRUB Configuration • User Interfaces (GUI and CUI)		
4	**Working with X-Windows (Ubuntu)**	• Layered Structure of X - Window Manager - Desktop Environment - Start Menu - User Configuration - startx Command • Window Managers - GNOME	20	7

		- KDE - Purpose of window manager • The KDE Desktop - KDE Panel - Desktop Icons - Managing Windows - The KDE Control Panel • The GNOME Desktop - The GNOME Panel - Desktop Icons - Managing Windows - The GNOME Control Panel • Configuring X - /etc/X11/Xorg.conf file - Tuning Xorg.conf - Choosing a Window Manager • Create, Delete, Rename, Copy files and folders • Install / Uninstall Software		
5.	**Linux Admin (Ubuntu)**	• 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	8
		Total	**100**	**60**

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

Reference Books

1. Stalling W, “Operating Systems”, 7th edition, Prentice Hall India.
2. Silberschatz, A., Peter B. Galvin and Greg Gagne, “Operating System Principles”, Wiley-Indian Edition, 8th Edition
3. Unix Shell Programming - Y. Kanetkar- BPB Publications
4. Unix concepts and applications- Sumitabha Das

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		
Sessions	**Topics**	**Marks**
I	♦ **CS – 19**	**50**
II	♦ **CS – 22**	**50**

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

CS - 24 : Practical Based on CS –20		
Sessions	**Topics**	**Marks**
I	♦ **CS – 20**	**100**

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