

SAURASHTRA UNIVERSITY

RAJKOT – INDIA



CURRICULAM

FOR

B.C.A.

Bachelor of Computer Application

(Semester III and Semester IV)

Effective From June – 2009

**Bachelor of Computer Application
(Semester – III and Semester - IV)
Saurashtra University
Effective from June - 2009**

B.C.A. (Semester – III)			
SR.NO	SUBJECT	NO. OF THEORY LECT. PER WEEK	NO. OF PRACTICAL PER WEEK
1	CS – 13 System Analysis and Design, Software Engineering & MS- Access	4+1	3
2	CS – 14 C++ and Object Oriented Programming	4+1	6
3	CS – 15 Developing Application In VISUAL BASIC – 6.0	4+1	6
4	CS –16 Web Development using PHP	4+1	6
5	CS – 17 Practical (Based On CS- 13, CS-15)	-	-
6	CS – 18 Practical (Based On CS- 14, CS-16,)	-	-

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CS – 13: System Analysis and Design, Software Engineering & MS-Access				
No.	Topics	Details	Marks	Min Lect.
1.	System Analysis & Design AND Software Engineering	<p>Definitions: System, Subsystem, Business System, Information System (Definitions only)</p> <p>Systems Analyst (Role: Information Analyst, Systems Designer & Programmer Analyst)</p> <p>SDLC</p> <p>Fact – finding techniques (Interview, Questionnaire, Record review and observation)</p> <p>Tools for Documenting Procedures and Decisions Decision Trees and Decision Tables</p> <p>Data Flow analysis Tool DFD (context and zero level) and Data Dictionary</p> <p>Software Engineering (Brief introduction)</p>	20	12
2.	Software Testing	<p>Software Testing Fundamentals</p> <p>Introduction Software Faults & Failures (Bug / Error / Defect / Faults / Failure)</p> <p>Testing pieces (Test case, Test Script, Test Plan, Test Harness, Test Suite)</p> <p>Types of Software Testing</p> <p>Verification & Validation Static Testing (Introduction) Test Levels (Introduction)</p>	15	9

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		Techniques of Software Testing Black - Box White - Box Grey - Box Nonfunctional Testing		
3.	Software Project Management	Managing Software Projects Project Management (4 P's & w ⁵ HH Principle) Metrics for Project (Software Measurement LOC & FP) Scheduling (The TimeLine/Gantt chart) Risk Management (Introduction) Quality Management (What is SQA? Six Sigma, ISO 9000)	10	6
4.	UML	Overview Class Diagram Use Case Diagram Activity Diagram	5	3
5.	Database and its Objects	Introduction Access Database and its Objects including Table, Query, Form, Reports, Macros and Modules, Page Creating Database Working with data including inserting, modifying and deleting records. Navigating Database including records, find and replace Access data types Object naming rules Normalization of table E.F.Codd rules	5	3

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6.	Tables	<p>Creating tables through wizard and design view, datasheet view</p> <p>Understanding field properties : field size, input mask, format, indexed, Required, Allow zero length, Validation rule , Validation text, Caption, Default value</p> <p>Working with primary keys, foreign key, composite key and candidate key</p> <p>Defining relationship and setting up the referential integrity (Cascade update and Cascade Delete)</p> <p>Importing Exporting and Linking objects with another application.</p>	15	9
7.	Queries	<p>Understanding and creating different queries including select, Action (append, delete, update, make-table), using wizard (cross-tab query, find duplicate query)</p> <p>Parameter query</p> <p>Understanding and implementing calculations and functions in queries</p>	10	6
8.	Forms	<p>Understanding forms and its properties</p> <p>Creating forms through different ways including wizard and design view</p> <p>Understanding and implementing necessary controls and their properties available in access, Creating Multiple-table and linked forms(subform)</p> <p>Adding calculated controls into form,</p> <p>Validating data and restricting data access.</p> <p>Creating Switch Board</p> <p>Creating charts and pivot tables reports</p>	5	3

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		Free-standing chart Embedded chart		
9.	Reports	Understanding Reports basics, Creating reports through wizard and design view, Sorting and grouping the report, Adding calculated controls into report.	5	3
10.	Data Access Pages	Understanding and designing data access pages Static page and Dynamic Page	5	3
11.	Macro	Understanding and designing macros, Utilizing macro with form and reports Conditional Macro Macro errors	5	3
TOTAL			100	60

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

TOTAL LECTURES 60+15=75

Reference Book

1. Access 2000 Bible
2. Mastering Access 2000
3. No Experience Required Access-2000
4. Analysis & Design of Information System - James A. Senn.
5. Fundamentals of Software Engineering – RajibMall (PHP)
6. Software Engineering – A Practitioner's Approach – Pressman
7. UML – A Beginner's Guide –Jasson Roff - TMH

Hands On (Not to be asked in Examination)

Creating introductory small business application using Switch Board

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CS - 14 : C++ and Object Oriented Programming				
No	Topics	Details	Marks	App. Lect.
1	Principles of object oriented programming	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	5	4
2	Tokens, expressions and control statements	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 Conditional control structure:- simple if, if...else , nested if else, switch etc. Looping control structure:- for, while , do...while	10	7
3	Functions in C++	The main function Function prototype Call by reference	10	6

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		Return by reference Inline function Default arguments Const arguments Functions overloading		
4	Classes and Objects	C structures revisited Specifying a class 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	15	7
5	Constructor and Destructor	Characteristics of constructor Parameterized constructor Multiple constructor in a class Constructor with default argument Copy constructor Dynamic initialization of objects Constructing two dimensional array Dynamic constructor Destructors	10	5
6	Operator overloading and type conversion	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.	10	6
7	Inheritance	Defining derived classes Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid) Virtual base class & Abstract class Constructors in derived class Nesting of classes.	10	5

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8	Pointer, Virtual functions and Polymorphism	Pointer to Object Pointer to derived class this pointer Rules for virtual function Virtual function and pure virtual function.	10	5
9	Console I/O operations	C++ streams C++ stream classes Unformatted and formatted I/O operations Use of manipulators.	5	5
10	Working with Files	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	10	7
11	Templates and Exception handling	Introduction to templates Class templates Function templates Member function templates Overloading of template function Non-type Template argument	5	3
TOTAL			100	60

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

Reference Books:

1. Object Oriented Programming in C++ - E.Balagurusamy, BPB
2. Mastering C++ - Venugopal
3. Object Oriented Programmin in C++ - Robaret Laphore
4. Let us C++ - Yashvant Kanitkar, BPB

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CS – 15 : Developing Application in Visual Basic 6.0				
No	Topic	Detail	Marks	App. Lect.
1	Introduction	OOPS Concepts VB as Event Driven Programming Property, Event and Method VB as IDE Controls Text Box, Label Command Button, Option Button Check Box, Frame Horizontal-Vertical Scroll Bar, Combo Box List Box, Timer, Shape Line, Drive List Box Directory List Box, File List Box Picture Box, Image Box Advance Controls Common Dialog Control Rich Text Box MSFlex Grid Use of MsgBox() and InputBox()	30	15
2	Variable, Operators, Constants, Decision Making, Looping and Array	Data Types Declaration of Variables Scope & Life Time of Variables (Local Variable, Form Variable Module Variable, Global Variable) Arithmetic & Relations Operators Decision Making using If & Select Case Loops using For, While..Wend, While Loop...End Loop, Do Loop..While, Do Until ...Loop Defining Array 1D, 2D, 3D Static & Dynamic Array Control Array	15	12
3	Multiple Forms, MDI	Using Multiple Forms Model Form & Modeless Form Parent & Child Form Concept	5	4

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		using MDI Form Difference of MDI & SDI		
4	Procedure, Functions, Menus	Creating Procedures & Functions Concept of ByRef & ByVal Concept of Public & Private Scope Use of Menu Editor	5	5
5	Library Functions	Functions Abs(),Array(),Asc() Choose(), Chr() Date(),DateAdd(),DateDiff(), DatePart(),DateSerial(),Day() Format(),FormatCurrency() FormatDateTime(), FormatNumber(), FormatPercent() IIf(),InStr(),InStrRev() IsArray(),IsDate(),IsNull(), IsNumeric() Join() LCase(),Left(),Len(), LoadPicture(),LTrim(),RTrim() Trim() Mid(),Month(),MonthName() Now() QBColor() Replace(),RGB(),Right(),Rnd() Space(),Split(),Sqr(),Str(), StrComp(),String(),StrReverse() Time() UCase() Val() WeekDay(),WeekDayName() Year()	10	8
6	File Handling	Sequential File Handling in VB	5	2
7	DataBase Programming	Introduction to ADO Control Bounded Connectivity & Unbounded Connectivity Create Projects with facilities like Add, Delete, Edit, Search Using DataList, DataCombo and DataGrid Controls	20	10
8	Advance	Short Note on Concepts of	10	4

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	Concepts	ActiveX Control, ActiveX DLL, OLE, API		
			100	60

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Students Test - 5 Lectures.

Reference Books :

1. Pure V.B. Dan Fox Tech Media
2. Mastering VB 6 Evagelous Petroustoss BPB
3. VB Black Book
4. Programming in Visual Basic 6.0 Julia Bradley TMH Pub

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CS – 16 : Website Development Using PHP				
No.	Topic	Details	Marks	Min. Lect.
1	CSS	Introduction of Style sheet Types of Style sheet Class & ID CSS Font Property CSS Text Property CSS Background Property CSS Border Property CSS List Property CSS Padding Property CSS Margin Property	10	5
2	JavaScript	Introduction to JavaScript Operator Conditional Structure & Looping Structure Dialog Boxes Arrays User Define Function Built-in Functions <u>String :</u> charAt, concat, indexOf, lastIndexOf, replace, search, substr, substring, toLowerCase, toUpperCase <u>Math :</u> abs, ceil, floor, pow, random round, max, min <u>Date :</u> date, getDate, getDay, getMonth, getYear, getFullYear, getHours, getMinutes, getSeconds, getMilliseconds, setDate, setDay, setMonth, setYear, setFullYear, setHours, setMinutes, setSeconds <u>Array :</u> Join, reverse, pop, push, shift, sort User Define Object Document Object History Object Navigator Object	20	15

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		<p>Form Object & Elements Events: onclick, ondblclick, onblur, onfocus, onchange, onkeypress, onkeydown, onkeyup, onMousemove, onmouseout, onsubmit, onreset, onselect, onload, onunload, timer event</p>		
3	PHP Basic	<p>Introduction to PHP PHP configuration in IIS & Apache Web server PHP Variable Static & global variable GET & POST method PHP Operator Conditional Structure & Looping Structure Array User Define Function: - argument function - default arument - variable function - return function Variable Length Argument Function - func_num_args - func_get_arg, func_get_args Variable Function Gettype, settype, isset, unset, strval, floatval, intval, print_r String Function Chr, ord, strtolower, strtoupper, strlen, ltrim, rtrim trim, substr, strcmp, strcasecmp, stripslashes, strpos, strstr, stristr, str_replace, strrev, echo, print Math Function Abs, ceil, floor, round, fmod, min, max, pow, sqrt, rand Date Function Date, getdate, setdate, Checkdate, time, mktime Array Function Count, list, in_array, current, next, previous, end, each, sort, rsort, asort, arsort,</p>	20	15

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		array_merge, array_reverse Miscellaneous Function define, constant, include, require, header, die File handling Function fopen, fread, fwrite, fclose, file_exists, is_readable, is_writable, fgets, fgetc, file, file_get_contents, file_putcontents, ftell, fseek, rewind, copy, unlink, rename, move_upload_file		
4	PHP Components	PHP GD Library PHP Regular expression function Cookies Session Server variable Database Connectivity with MySQL (Using PhpMyAdmin)	30	15
5	Advance PHP	PHP with OOPS Class, constructor, inheritance, serialize objects PHP with XML XML introduction Simple XML functions PHP with AJAX AJAX introduction XMLHttpRequest AJAX with MySQL Database	20	10
TOTAL :			100	60

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

Reference Books:

5. Pure JavaScript
6. HTML, DHTML, JavaScript, Perl & CGI
7. Beginning PHP5
8. PHP Bible
9. Professional PHP5
10. PHP Manual

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CS-17 : Practical Based On CS – 13 & CS – 15		
Sessions	Topics	Marks
I	CS – 13	50
II	CS – 15	50

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

CS-18 : Practical And Viva Based On CS – 14 & CS – 16		
Sessions	Topics	Marks
I	CS – 14	50
II	CS – 16	50

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

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B.C.A. (Semester – IV)			
SR.NO	SUBJECT	NO. OF THEORY LECT. PER WEEK	NO. OF PRACTICAL PER WEEK
1	CS – 19 Graphics using C	4+1	6
2	CS – 20 Programming with JAVA	4+1	6
3	CS – 21 RDBMS Using Oracle	4+1	6
4	CS –22 Operating Systems Concepts With Unix / Linux	4+1	3
5	CS – 23 Practical (Based On CS- 19, CS-20)	-	-
6	CS – 24 Practical (Based On CS- 21, CS-22)	-	-

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CS - 19 : Computer Graphics Using 'C'				
No.	Topic	Details	Marks	Approx. Lect.
1	Graphics Library	<p>Text mode & Graphics mode Resolution 2D Co-ordinate sysyem (Rectangle & Polar) Use of various graphics library functions (arc, bar, bar3d, circle, cleardevice, clearviewport, closegraph, detectgraph, drawpoly, ellipse, fillellipse, fillpoly, floodfill, getbkcolor, getcolor, getimage, getmaxcolor, getmaxx, getmaxy, getpixel, getx, gety, graphdefaults, grapherrormsg, graphresult, imagesize, initgraph, line, linerel, lineto, moverel, moveto, outtext, outtextxy, pieslice, putimage, putpixel, rectangle, restorecrtmode, sector, setbkcolor, setcolor, setfillpattern, setfillstyle, setgraphmode, setlinestyle, settextjustify, settextstyle, setviewport, textheight, textwidth) Programming exercises based on above functions</p>	30	18
2	Drawing Basic Shapes	<p>Algorithm & Program for the followings ü DDA line drawing ü Line drawing using it's parametric representation ü Brasenham line drawing ü Brasenham circle drawing ü Brasenham ellipse drawing ü Circular arc drawing ü Rectangle drawing ü Cubic curve drawing (B-spline and Bezier)</p>	15	10
3	2D geometric transformations	<p>Overview of transformation Various basic transformations ü Translation, Scaling, Rotation(w.r.t. origin & w.r.t. any arbitrary point), Reflection(w.r.t. x-axis, y-</p>	15	10

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		<p>axis, line $y=x$, line $y=-x$, origin), Shearing(x-shear and y-shear) ü Representation of transformation using matrix Homogeneous Co-ordinate system ü Concept & need ü Representation of various basic transformation matrices using homogeneous co-ordinate system Composite transformation ü Exercises to obtain 3X3 composite transformation matrix for a given specific set of transformation sequence. Define UDF for each of the above transformation Programming exercises to apply transformations (translation, scaling, rotation only) to a basic shape (line, rectangle, triangle, circle only)</p>		
4	Clipping & Filling	<p>Concept of windowport and viewport Overview of clipping Sutherland Cohen line clipping algorithm &its program Overview of filling Stack based seed filling algorithm & its program ü Floodfill procedure ü Boundaryfill procedure</p>	10	06
5	Drawing Chart	<p>Overview of chart Types of charts(line chart, bar chart, pie chart) Programming exercise to draw a chart(line, bar, pie) for specific set of data points. (Note : No. of data points should be entered from keyboard)</p>	07	04
6	Fractals	<p>Overview of fractal Topological dimension & fractal dimension Classification of fractals (self similar, self affine, invariant(self squaring & self inverse))</p>	08	05

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		Geometric construction of self similar fractals Programming exercise to draw self similar fractals Concept of self squaring fractals Concept of self inverse fractals		
7	Drawing with mouse	Int86() function with interrupt 33h & its various services UDF for the followings <ul style="list-style-type: none"> ü To initialize mouse ü To show mouse pointer ü To hide mouse pointer ü To get mouse position & button status ü To restrict mouse pointer Programming exercise for the following <ul style="list-style-type: none"> ü Freehand drawing using mouse ü Line drawing using mouse ü Rectangle drawing using mouse ü Circle drawing using mouse ü Designing & working with menus using mouse 	15	07
TOTAL			100	60

Student Seminar : 05 Lectures
 Expert Talk : 05 Lectures
 Student Test : 05 Lectures
 Total : 75 Lectures

Reference Books :

Graphics under 'C' by Yashwant Kanetkar (BPB)
 Computer Graphics & Multimedia by D.P. Mukherji (PHI)
 Computer Graphics by Donald Hearn, M. Pauline baker (PHI)
 Mastering Turbo 'C' (BPB)

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CS – 20 Programming with JAVA				
No	Topic	Details	Marks	Lect.
1	Basics	Java Features, JDK and its components (Various tools of JDK), Bytecode and JVM Language building blocks (Tokens, identifiers, keywords, literals, white spaces, comments) Primitive data types and their initial values, arrays, operators – precedence and associativity ,type conversion and casting, garbage collection Loop statements – while,do,for,break,continue decision statements – if – else, switch	10	8
2	Class Fundas	Defining classes, creating objects, constructors, overloading and overriding of methods, static members, final variable and methods, abstract methods and class, finalize methods, inheritance using class, inheritance using interface, Nested classes access specifiers : public, protected, private, default modifiers : final, abstract, static, synchronized, native, volatile, transient	15	11
3	Packages	Java API packages (java.applet, java.awt, java.awt.event, java.io, java.lang, java.net, java.util, javax.swing etc.) which package is used for what purpose naming conventions, creating ,accessing and using packages, adding class to pacakage java.lang package classes (Object,Math,String,StringBuffer,Wrapper classes) java.util package classes (Date, Random, Calendar, GregorianCalendar, Vector, enumeration interface, Stack, Hashtable, StreamTokenizer)	10	8
4	Multithreading and Exception handling	Multithreading Thread, Java Thread Model, Implementing threads in two ways - Thread class and Runnable interface, various thread methods, thread states – (running, ready,dead, waiting states – waiting, sleeping, suspended, blocked), thread priorities, Synchronization and monitors – how to implement, deadlock in thread Exception Handling Exception,Types of exception, exception handling using try,catch, finally, throw, throws etc.	15	10

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5	Event Handling	Event Delegation Model or Event Class Hierarchy, All classes and interfaces of Event Delegation Model, Programmes related to event handling covering all types of events.	10	5
6	Applets	Applet class, Applet Life cycle, AppletContext class, Applet tag, passing parameters to applet, Use of java.awt.Graphics class and its various methods in an Applet	10	3
7	Input / Output	Concept of streams, Difference between CharacterStreams and ByteStreams CharacterStreams Reader, Writer, FileReader, FileWriter, BufferedReader, BufferedWriter, PrintWriter ByteStreams InputStream, OutputStream, FileInputStream, FileOutputStream, FilterInputStream, BufferedInputStream, BufferedOutputStream, DataInputStream, DataOutputStream, ObjectInputStream, ObjectOutputStream PrintStream Other Classes RandomAccessFile, StreamTokenizer, File	15	5
8	Swing	Layout managers FlowLayout, BorderLayout, CardLayout, BoxLayout GridBagLayout, GridLayout, GroupLayout, SpringLayout GUI with Swing What is swing, Swing Vs AWT, Container class, JApplet, JLabel, JButton, JCheckBox, JCheckboxgroup, JChoice, JTextField, JTextArea, JList, JScrollbar, JPanel, JFrame, JMenu, JMenuBar, JMenuItem, JPasswordField, JRadioButton	15	10
TOTAL :			100	60

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

Reference Books:

1. Complete JAVA2 Certification
2. JAVA2 Black Book
3. A Programmer Guide to JAVA Certification By Khalid A. Mughal

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CS – 21 : RDBMS Using Oracle				
No.	Topics	Details	Marks	Min Lect.
1	SQL, SQL*Plus	Introduction to SQL SQL Commands and Datatypes Introduction to SQL*Plus SQL*Plus formatting commands Operator and Expression SQL v/s SQL*Plus	5	3
2	Managing Tables and Data	Creating and Altering tables (Including constraints) Data Manipulation Command like Insert, update, delete SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL, BETWEEN, EXISTS, LIKE Join, subquery, Built in functions	15	10
3	Other ORACLE database objects	View Sequence Synonyms, Database Links Index Cluster , Snapshot	8	5
4	Data Control and Transaction Control Command	Grant,Revoke,Role,Creating Users What is transaction? Starting and Ending of Transaction Commit, Rollback, Savepoint	5	4
5	Introduction to 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)	12	8
6	Advanced PL/SQL	Creating and Using Procedure, Functions, Package, Triggers Creating Objects, Object in Database-Table PL/SQL Tables, Nested Tables, Varrays	20	12
7	Oracle Database Structure	Instance Architecture 1. Database Processes 2. Memory Structure.	25	14

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		<p>3. 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</p>		
8	Backup & Recovery	<p>Backup & Recovery Types of Backups Control File Backups Redo Log File Backups Cold Backups Hot Backups Net 8 What is Net 8 ? Why use Net 8 ? Net 8 Features Listener Dispatcher</p>	10	4
TOTAL			100	60

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

Reference Books:

1. SQL,PL/SQL The programming - Lang.Of Oracle Ivan Bayross - BPB
2. Using Oracle 8i - Page, Hughes - QUE & PHI Publications
3. Oracle 8i The Complete Reference - George Koch, Kevin Loney - Oracle Press and Tata MacGraw-Hill

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CS – 22 : Operating Systems Concepts With Unix / Linux				
No	Topics	Details	Mark s	App · Lect
1.	Introduction	Meaning of OS Functions of OS Evolution of an OS Batch OS Multiprogramming OS Time Sharing OS Real time OS	10	5
2.	Process	Introduction of OS process Process State Transition Diagram Process Scheduling FCFS SJN Round Robin Priority Base Non Preemptive Priority Base Preemptive Difference between Multi processing, Multi tasking and Multi threading OS	10	6
3.	Memory Management	Physical Memory and Virtual Memory Memory Allocation Contiguous Memory Allocation Noncontiguous Memory Allocation Virtual Memory Using Paging Virtual Memory Using Segmentation	10	5
4.	Starting With Unix	Unix Architecture Unix Features Types Of Shell (C, Bourn, Korn) Login Commands passwd, logout, who, who am i, clear	5	2

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5.	Unix File System And Related Commands	Unix File System Overview Types Of Files Ordinary Files Directory Files Device Files Unix File & Directory Permissions Related Commands ls, cat, cd, pwd, mv, cp, ln, rm, rmdir, mkdir, umask, chmod, chown, chgrp, find,pg,more,less,head,tail,wc,touch	10	4
6.	Text Editing With vi Editor	Introduction of vi editor Modes in vi Switching mode in vi Cursor movement Screen control commands Entering text, cut, copy, paste in vi editor	5	2
7.	IO Redirection And Piping	Concept Of Redirection Concept Of Piping Operators in Redirection & Piping < > << >> Examples for Redirection & Piping	5	3

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8.	Advance Tools In Unix	<p>Finding Patterns in Files grep,fgrep,egrep</p> <p>Working with columns and fields cut,paste,join</p> <p>Tools for sorting sort,uniq</p> <p>Comparing files cmp,comm.,diff</p> <p>Changing Information in Files tr,sed,</p> <p>Examining File Contents od</p> <p>Tools for mathematical calculations bc,factor</p> <p>Monitoring Input and Output tee,script</p> <p>Tools For Displaying Date and Time cal,date</p> <p>Communications telnet,wall,mtod,write,mail,news, finger</p> <p>Process Related Commands : ps, command to run process in background, nice,kill,at,batch,cron, crontab,wait,sleep</p> <p>Concept of Mounting a File System mount command</p> <p>Concept of DeMounting a File System umount command</p>	20	13
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9.	Shell Programmin g	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 for loop while loop until loop break, continue command Arithmetic in Shell script using expr Various shell script examples.	25	20
TOTAL			100	60

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

Reference Books

4. Unix Shell Programming Y. Kanetkar BPB Publications
5. 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.

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Demo of GNOME, KDE Desktops in Linux.

CS - 23 : Practical based on CS – 19 & CS – 20		
Sessions	Topics	Marks
I	CS – 19	50
II	CS – 20	50

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

CS - 24 : Practical Based on CS –21 & CS – 22		
Sessions	Topics	Marks
I	CS – 21	50
II	CS – 22	50

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