

**SAURASHTRA UNIVERSITY**

**RAJKOT – INDIA**



**CURRICULAM**

**FOR**

**B.C.A.**

**Bachelor of Computer Application**

**(Semester III and Semester IV)**

**Effective From June – 2017**

**Bachelor of Computer Application**  
**(Semester – III and Semester - IV)**  
**Saurashtra University**  
**Effective from June - 2017**

<b>B.C.A. (Semester – III)</b>			
<b>SR.NO</b>	<b>SUBJECT</b>	<b>NO. OF LECT. PER WEEK</b>	<b>Credit</b>
1	<b>CS – 13</b> SAD, Software Quality Assurance and Testing	5	5
2	<b>CS – 14</b> C++ and Object Oriented Programming	5	5
3	<b>CS – 15</b> RDBMS Using Oracle	5	5
4	<b>CS –16</b> Content Management System using Word Press	5	5
5	<b>CS – 17</b> Practical (Based On CS-13, CS-14)	5	5
6	<b>CS – 18</b> 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.

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<b>CS – 13 : SAD, Software Quality Assurance and Testing</b>				
<b>No.</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min Lect.</b>
<b>1</b>	System Analysis & Design AND Software Engineering, Concepts of Quality Assurance	<ul style="list-style-type: none"> <li>• Definitions: System, Subsystem, Business System, Information System (Definitions only)</li> <li>• Systems Analyst (Role: Information Analyst, Systems Designer &amp; Programmer Analyst)</li> <li>• SDLC</li> <li>• Fact – finding techniques (Interview, Questionnaire, Record review and observation)</li> <li>• Tools for Documenting Procedures and Decisions Decision Trees and Decision Tables</li> <li>• Data Flow analysis Tool DFD (context and zero level) and Data Dictionary</li> <li>• Software Engineering (Brief introduction)</li> <li>• Introduction to QA</li> <li>• Quality Control (QC)</li> <li>• Difference between QA and Q</li> <li>• Quality Assurance activities</li> </ul>	<b>20</b>	<b>13</b>

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2	<b>Basics of Software Testing, Types of Software Testing, Verification and Validation</b>	<ul style="list-style-type: none"> <li>▪ Introduction to software Testing</li> <li>▪ Software faults and failures <ul style="list-style-type: none"> <li>• Bug/Error/Defect/Faults/Failures</li> </ul> </li> <li>▪ Testing Artifacts <ul style="list-style-type: none"> <li>• Test case</li> <li>• Test Script</li> <li>• Test Plan</li> <li>• Test Harness</li> <li>• Test Suite</li> </ul> </li> <li>▪ Static Testing <ul style="list-style-type: none"> <li>• Informal Review</li> <li>• Walthrough</li> <li>• Technical Review</li> <li>• Inspection</li> </ul> </li> <li>▪ Dynamic Testing</li> <li>▪ Test levels <ul style="list-style-type: none"> <li>• Unit Testing</li> <li>• Integration Testing</li> <li>• System Testing</li> <li>• Acceptance Testing</li> </ul> </li> </ul> <p>Techniques of software Testing</p> <ul style="list-style-type: none"> <li>▪ Black Box Testing <ul style="list-style-type: none"> <li>• Equivalence Partitioning</li> <li>• Boundary Data Analysis</li> <li>• Decision Table Testing</li> <li>• State Transition Testing</li> </ul> </li> <li>▪ White Box Testing <ul style="list-style-type: none"> <li>• Statement testing and coverage</li> <li>• Decision testing and coverage</li> </ul> </li> <li>▪ Grey Box Testing</li> <li>▪ Nonfunctional Testing <ul style="list-style-type: none"> <li>• Performance Testing</li> <li>• Stress Testing</li> <li>• Load Testing</li> <li>• Usability Testing</li> <li>• Security Testing</li> </ul> </li> </ul>	<b>20</b>	<b>15</b>
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3	<b>Software Development Life Cycle Models, Automated Testing</b>	<ul style="list-style-type: none"> <li>▪ Waterfall Model</li> <li>▪ Iterative Model</li> <li>▪ V-Model</li> <li>▪ Spiral Model</li> <li>▪ Big Bang Model</li> <li>▪ Prototyping Model</li> <li>▪ Introduction <ul style="list-style-type: none"> <li>• Concept of Freeware, Shareware, licensed tools</li> </ul> </li> <li>▪ Theory and Practical Case-Study of Testing Tools <ul style="list-style-type: none"> <li>• Win runner</li> <li>• Load runner</li> <li>• QTP</li> <li>• Rational Suite</li> </ul> </li> </ul>	<b>20</b>	<b>12</b>
4	<b>Project Economics, Project scheduling and Tracking</b>	<ul style="list-style-type: none"> <li>▪ Concepts of Project Management</li> <li>▪ Project Costing based on metrics</li> <li>▪ Empirical Project Estimation Techniques.</li> <li>▪ Decomposition Techniques.</li> <li>▪ Algorithmic methods.</li> <li>▪ Automated Estimation Tools</li> <li>▪ Concepts of project scheduling and tracking</li> <li>▪ Effort estimation techniques</li> <li>▪ Task network and scheduling methods</li> <li>▪ Timeline chart</li> <li>▪ Pert Chart</li> <li>▪ Monitoring and control progress</li> <li>▪ Graphical Reporting Tools</li> </ul>	<b>20</b>	<b>10</b>

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5	<b>CAD Project Management Tool, UML</b>	<ul style="list-style-type: none"> <li>▪ MS – VISIO for designing &amp; Documentation</li> <li>▪ MS – Project for controlling and Project Management</li> <li>▪ UML designing and skill based tools</li> </ul> Overview of <ul style="list-style-type: none"> <li>◆ Class Diagram</li> <li>◆ Use Case Diagram</li> <li>◆ Activity Diagram</li> </ul>	20	10
<b>TOTAL</b>			<b>100</b>	<b>60</b>

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

**TOTAL LECTURES 60+15=75**

**Reference Book**

1. Analysis & Design of Information System - James A. Senn.
2. Pankaj Jalote, "Software Engineering – A Precise Approach", Wiley India
3. UML Distilled by Martin Fowler, Pearson Edition, 3rd Edition
4. Fundamentals of Software Engineering – RajibMall (PHP)
5. Software Engineering – A Practitioner’s Approach – Pressman
6. UML – A Beginner’s Guide –Jasson Roff – TMH
7. Roger Pressman , "Software Engineering"
8. [http://en.wikipedia.org/wiki/Software\\_testing](http://en.wikipedia.org/wiki/Software_testing)
9. <http://www.onestoptesting.com/>
10. <http://www.opensourcetesting.org/functional.php>

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<b>CS - 14 : C++ and Object Oriented Programming</b>				
No	Topics	Details	Marks weight in %	App. Lect.
1	<b>Principles of object oriented programming</b> <b>Tokens, expressions and control statements</b>	<ul style="list-style-type: none"> <li>• Procedure – oriented programming</li> <li>• Object oriented programming paradigm</li> <li>• Basic concepts of object oriented Programming</li> <li>• Benefits of object oriented programming</li> <li>• Application of object oriented programming</li> <li>• What is c++?</li> <li>• Application of c++</li> <li>• Input/output operators</li> <li>• Structure of c++ program</li> <li>• Introduction of namespace</li> <li>• 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</li> <li>• Operators in C++: scope resolution operator, member referencing operator, memory management operator, manipulators, type cast operator.</li> <li>• Expression : Expression and their types, special assignment operator, implicit conversions, operator precedence</li> <li>• Control structures <ul style="list-style-type: none"> <li>◆ Conditional control structure :- simple if, if...else , nested if else, switch etc.</li> <li>◆ Looping control structure:- for, while , do...while</li> </ul> </li> </ul>	20	15
	<b>Functions in C++</b>	<ul style="list-style-type: none"> <li>• The main function</li> <li>• Function prototype</li> <li>• Call by reference</li> <li>• Return by reference</li> <li>• Inline function</li> <li>• Default arguments</li> <li>• Const arguments</li> </ul>		

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		<ul style="list-style-type: none"> <li>• Functions overloading</li> <li>• Adding C Functions turbo C++</li> </ul>		
<b>2</b>	<b>Classes and Objects, Constructor and Destructor</b>	<ul style="list-style-type: none"> <li>• C structures revisited</li> <li>• Specifying a class</li> <li>• Local Classes</li> <li>• Nested Classes</li> <li>• Defining member functions, nesting of Member functions, private member function, making outside function inline</li> <li>• Arrays within a class</li> <li>• Memory allocation for objects</li> <li>• Static data member</li> <li>• Static member functions</li> <li>• Arrays of objects</li> <li>• Objects as function arguments</li> <li>• Friendly functions</li> <li>• Returning objects</li> <li>• Const member function</li> <li>• Pointer to members</li> </ul>	20	12
		<ul style="list-style-type: none"> <li>• Characteristics of constructor</li> <li>• Explicit constructor</li> <li>• Parameterized constructor</li> <li>• Multiple constructor in a class</li> <li>• Constructor with default argument</li> <li>• Copy constructor</li> <li>• Dynamic initialization of objects</li> <li>• Constructing two dimensional array</li> <li>• Dynamic constructor</li> <li>• MIL , Advantage of MIL</li> <li>• Destructors</li> </ul>		



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<b>3</b>	<b>Operator overloading and type conversion, Inheritance</b>	<ul style="list-style-type: none"> <li>• Concept of operator overloading</li> <li>• Over loading unary and binary operators</li> <li>• Overloading of operators using friend Function</li> <li>• Manipulation of string using operators</li> <li>• Rules for operator overloading</li> <li>• Type conversions.</li> <li>• Comparison of different method of conversion</li> <li>• Defining derived classes</li> <li>• Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid)</li> <li>• Virtual base class &amp; Abstract class</li> <li>• Constructors in derived class</li> <li>• Application of Constructor and Destructor in inheritance</li> <li>• Containership, Inheritance V/s Containership</li> </ul>	20	11
<b>4</b>	<b>Pointer, Virtual functions and Polymorphism, RTTI Console I/O operations</b>	<ul style="list-style-type: none"> <li>• Pointer to Object</li> <li>• Pointer to derived class</li> <li>• this pointer</li> <li>• Rules for virtual function</li> <li>• Virtual function and pure virtual function.</li> <li>• Default argument to virtual function</li> <li>• Run Time Type Identification</li> <li>• C++ streams</li> <li>• C++ stream classes</li> <li>• Unformatted and formatted I/O operations</li> <li>• Use of manipulators.</li> </ul>	20	10

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<b>5</b>	<b>Working with Files, Exception handling, Introduction to Template STL</b>	<ul style="list-style-type: none"> <li>• File stream classes</li> <li>• Opening and closing a file</li> <li>• Error handling</li> <li>• File modes</li> <li>• File pointers</li> <li>• Sequential I/O operations</li> <li>• Updating a file (Random access)</li> <li>• Command line arguments</li> <li>• Overview of Exception Handling</li> <li>• Need for Exception Handling</li> <li>• various components of exception handling</li> <li>• Overview of Exception Handling</li> <li>• Introduction to templates</li> <li>• Class templates</li> <li>• Function templates</li> <li>• Member function templates</li> <li>• Overloading of template function</li> <li>• Non-type Template argument</li> <li>• Primary and Partial Specialization</li> <li>• Introduction to STL</li> <li>• Overview of iterators, containers</li> </ul>	20	12
<b>TOTAL</b>			100	60

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

**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

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<b>CS – 15 : RDBMS Using Oracle</b>				
<b>No.</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min Lect.</b>
<b>1</b>	<b>DBMS Overview, SQL, SQL*Plus</b>	<ul style="list-style-type: none"> <li>• Introduction to DBMS</li> <li>• Introduction to RDBMS</li> <li>• Dr.E.F.Codd Rules</li> <li>• Importance of E.R.Diagram in Relational DBMS.</li> <li>• Normalization</li> <li>• Introduction to SQL</li> <li>• SQL Commands and Datatypes</li> <li>• Introduction to SQL*Plus</li> <li>• SQL*Plus formatting commands</li> <li>• Operator and Expression</li> <li>• SQL v/s SQL*Plus</li> </ul>	20	10
<b>2</b>	<b>Managing Tables and Data, Data Control And Transaction Control Command</b>	<ul style="list-style-type: none"> <li>• Creating , Altering &amp; Dropping tables</li> <li>• Data Manipulation Command like</li> <li>• Insert, update, delete</li> <li>• Different type of constraints and applying of constration</li> <li>• SELECT statement with WHERE, GROUP BY and HAVING,ROLLUP AND CUBE, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL, BETWEEN, EXISTS, LIKE</li> <li>• Join (Inner join ,outer join, self join)</li> <li>• subquery, minus, intersect, union</li> <li>• Built in functions</li> <li>• Numeric Function abs, ceil, cos, decode, exp, floor, greatest, least, log, log10, max, min, rem, round , sign, sin, sinh, sqrt, tan, trunc</li> <li>• Character Function chr, concat, initcap, lower, lpad, ltrim, replace, rpad, rtrim, soundex, substr, treat, trim, upper</li> <li>• Date Function add_months, last_day, months_between, next_day, round (date), sysdate, systimestamp, trunc (date), to_date, to_char</li> <li>• Aggregate function Sum, Count, AVG, MAX, MIN</li> <li>• General Functions COALESCE, CASE WHEN, DECODE</li> <li>• Creating user &amp; role</li> </ul>	20	15

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		<ul style="list-style-type: none"> <li>• Grant, Revoke command</li> <li>• What is transaction?</li> <li>• Starting and Ending of Transaction</li> </ul> <p>Commit, Rollback, SavePoint</p>		
3	<b>Other ORACLE Database Objects, Concurrency control using lock</b>	<ul style="list-style-type: none"> <li>• View</li> <li>• Sequence</li> <li>• Synonyms,</li> <li>• Database Links</li> <li>• Index <ul style="list-style-type: none"> <li>○ B*Tree Indexes</li> <li>○ Bitmap Indexes</li> <li>○ Function-Based Indexes</li> <li>○ Application Domain Indexes</li> </ul> </li> <li>• Cluster,</li> <li>• Snapshot</li> <li>• What Are Locks?</li> <li>• Locking Issues <ul style="list-style-type: none"> <li>○ Lost Updates</li> <li>○ Pessimistic Locking</li> <li>○ Optimistic Locking</li> <li>○ Blocking</li> <li>○ Deadlocks</li> <li>○ Lock Escalation</li> </ul> </li> <li>• Lock Types <ul style="list-style-type: none"> <li>○ DML Locks</li> <li>○ DDL Locks</li> <li>○ Latches</li> <li>○ Manual Locking and User-Defined Locks</li> </ul> </li> </ul>	15	10
4	<b>Introduction to PL/SQL, Advanced PL/SQL</b>	<ul style="list-style-type: none"> <li>• SQL v/s PL/SQL</li> <li>• PL/SQL Block Structure</li> <li>• Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)</li> <li>• %TYPE and %ROWTYPE</li> <li>• Using Cursor(Implicit, Explicit) <ul style="list-style-type: none"> <li>• Exception Handling</li> </ul> </li> <li>• Creating and Using Procedure, Functions,</li> <li>• Package,</li> <li>• Triggers</li> <li>• Creating Objects,</li> <li>• Object in Database-Table</li> <li>• PL/SQL Tables, Nested Tables, Varrays</li> </ul>	20	15

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<b>5</b>	<b>Oracle Database Structure and Storage Database, Resource Management and Task Scheduling</b>	<ul style="list-style-type: none"> <li>• Instance Architecture <ul style="list-style-type: none"> <li>○ Database Processes</li> <li>○ Memory Structure.</li> <li>○ Data files</li> </ul> </li> <li>• Creating &amp; Altering Database</li> <li>• Opening &amp; shutdown Database</li> <li>• Initialization Parameter</li> <li>• Control Files, Redo Logs files</li> <li>• Tablespace(Create, Alter, Drop)</li> <li>• Rollback Segment (Create, Alter ) (System &amp; Transaction RBS)</li> <li>• Oracle Blocks</li> <li>• Import <ul style="list-style-type: none"> <li>• Export</li> <li>• SQL*Loader</li> <li>• Managing Automated Database Maintenance Tasks</li> <li>• Managing Resources with Oracle Database Resource Manager</li> <li>• Oracle Scheduler Concepts</li> <li>• Scheduling Jobs with Oracle Scheduler</li> <li>• Administering Oracle Scheduler</li> </ul> </li> </ul>	20	10
<b>Total</b>			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**

**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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<b>CS – 16: Content Management System using Word Press Word Press</b>				
<b>No.</b>	<b>Topic</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min. Lect.</b>
<b>1</b>	<b>OOP</b>	<ul style="list-style-type: none"> <li>- Concept of oop               <ul style="list-style-type: none"> <li>• Class</li> <li>• Property</li> <li>• Visibility</li> <li>• Constructor</li> <li>• Destructor</li> <li>• Inheritance</li> <li>• Scope Resolution Operator (::)</li> <li>• Autoloading Classes</li> <li>• Class Constants</li> </ul> </li> <li>- Mysql Database handling with oop (insert, update, select, delete)</li> </ul>	10	6
<b>2</b>	<b>Introduction Installation &amp; Configuration</b>	<ul style="list-style-type: none"> <li>What is Content Management System (CMS)?</li> <li>- Introduction of Wordpress</li> <li>- Features of Wordpress               <ul style="list-style-type: none"> <li>- Advantages &amp; Disadvantages of Wordpress</li> </ul> </li> <li>- Installation of wordpress.</li> <li>- Wordpress Directory &amp; file structure.</li> <li>- Dashboard overview</li> <li>- How to add, edit and delete page, category, post, tag.</li> <li>- Add new media file (image, pdf, doc etc.) &amp; attach to post or page.</li> <li>- User Roles and Capabilities.</li> <li>- Setting (General, writing, Reading, Discussion, Media, Permalinks)</li> <li>- Updating wordpress               <ul style="list-style-type: none"> <li>• One-click Update</li> <li>• Manual Update</li> </ul> </li> <li>- Database Structure</li> </ul>	15	9
<b>3</b>	<b>Theme</b>	<ul style="list-style-type: none"> <li>- What is theme?</li> <li>- How to install &amp; activate theme.</li> <li>- Introduction of common WordPress theme template files.</li> </ul>	25	15
	<b>Widget</b>	<ul style="list-style-type: none"> <li>- What is widget &amp; widget Areas?</li> <li>- Widget Management               <ul style="list-style-type: none"> <li>• Available Widgets (Archive, Calendar, Categories, Custom Menu, Meta, Pages, Recent Comments, Recent Posts, RSS, Search, Tag Cloud, Text)</li> <li>• Inactive Sidebar (not used)</li> <li>• Inactive Widgets</li> </ul> </li> </ul>		

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	<b>Plugin</b>	<ul style="list-style-type: none"> <li>- What is plugin?</li> <li>- How to install and activate plugin.</li> <li>- Useful plugins for website. <ul style="list-style-type: none"> <li>• Seo yoast</li> <li>• Contact form 7</li> <li>• Woocommerce</li> <li>• WP Super Cache</li> <li>• Regenerate Thumbnails</li> <li>• Advanced Custom Fields</li> </ul> </li> </ul>		
<b>4</b>	<b>Theme development</b>	<ul style="list-style-type: none"> <li>- Anatomy of a Theme: header.php, footer.php and sidebar.php</li> <li>- 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)</li> <li>- The Loop (have_posts (), the_post())</li> <li>- Template Tags <ol style="list-style-type: none"> <li>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(), body_class())</li> <li>2. Author tags (the_author(), get_the_author(), the_author_link(), get_the_author_link(), the_author_meta(), the_author_posts())</li> <li>3. Category tags (category_description(), single_cat_title(), the_category() )</li> <li>4. Link tags (the_permalink(), get_permalink(), home_url(), get_home_url(), site_url(), get_site_url())</li> <li>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() )</li> <li>6. Post Thumbnail tags (has_post_thumbnail(), get_post_thumbnail_id(), the_post_thumbnail(), get_the_post_thumbnail())</li> </ol> </li> </ul>	30	18

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		<p>7. Navigation Menu tags (wp_nav_menu())</p> <p>8. Conditional Tags (is_archive(), is_category(), is_front_page(), is_home(), is_page(), is_single(), is_search(), is_attachment(), is_active_sidebar())</p> <p>- functions.php file</p>		
<b>5</b>	<b>Advanced development</b>	<p>- Advanced functions</p> <ul style="list-style-type: none"> <li>• add_action()</li> <li>• add_filter()</li> <li>• add_shortcode()</li> <li>• do_shortcode()</li> <li>• register_nav_menu()</li> </ul> <p>- Custom Post Types</p> <ul style="list-style-type: none"> <li>• register_post_type()</li> <li>• register_taxonomy()</li> </ul> <p>- Widget Area</p> <ul style="list-style-type: none"> <li>• register_sidebar()</li> </ul> <p>dynamic_sidebar()</p>	20	12
<b>TOTAL:</b>			100	60

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

**TOTAL LECTURES 60+15=75**

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 3<sup>rd</sup> Edition.
3. Wordpress for Beginners 2017: 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)



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<b>CS-17 : Practical Based On CS – 13 &amp; CS – 14</b>		
<b>Sessions</b>	<b>Topics</b>	<b>Marks</b>
I	♦ CS – 13	50
II	♦ CS – 14	50

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

<b>CS-18 : Practical And Viva Based On CS – 15 &amp; CS – 16</b>		
<b>Sessions</b>	<b>Topics</b>	<b>Marks</b>
I	♦ CS – 15	50
II	♦ CS – 16	50

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

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<b>B.C.A. (Semester – IV)</b>			
<b>SR.NO</b>	<b>SUBJECT</b>	<b>NO. OF LECT. PER WEEK</b>	<b>CREDIT</b>
1	<b>CS – 19</b> Programming with JAVA	5	5
2	<b>CS – 20</b> Programming with C#	5	5
3	<b>CS – 21</b> Network Technology and Administration	5	5
4	<b>CS – 22</b> Operating Systems Concepts With Unix / Linux	5	5
5	<b>CS – 23</b> Practical (Based On CS- 19, CS-22)	5	5
6	<b>CS – 24</b> 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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<b>CS – 19 PROGRAMMING WITH JAVA</b>				
<b>No</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min Lec.</b>
<b>1</b>	<b>History, Introduction and Language, Basics Classes and Objects</b>	<ul style="list-style-type: none"> <li>- History and Features of Java</li> <li>- Java Editions</li> <li>- JDK, JVM and JRE</li> <li>- JDK Tools</li> <li>- Compiling and Executing basic Java Program</li> <li>- Java IDE (NetBeans and Eclipse)</li> <li>- Data Type (Integer, Float, Character, Boolean)</li> <li>- Java Tokens (Keyword, Literal, Identifier, Whitespace, Separators, Comments, Operators)</li> <li>- Operators (Arithmetic, Relational, Boolean Logical, Bitwise Logical, Assignment, Unary, Shift, Special operators)</li> <li>- Type Casting</li> <li>- Decision Statements (if, switch)</li> <li>- Looping Statements (for, while, do..while)</li> <li>- Jumping Statements (break, continue, return)</li> <li>- Array (One Dim., Rectangular, Jagged)</li> <li>- Command Line Argument Array</li> </ul> <hr/> <ul style="list-style-type: none"> <li>- OOP Concepts (Class, Object, Encapsulation, Inheritance, Polymorphism)</li> <li>- Creating and using Class with members</li> <li>- Constructor</li> <li>- finalize() method</li> <li>- Static and Non-Static Members</li> <li>- Overloading (Constructor &amp; Method)</li> <li>- Varargs</li> </ul>	<b>20</b>	<b>10</b>

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<b>2</b>	<b>Inheritance, Java Packages</b>	<ul style="list-style-type: none"> <li>- Universal Class (Object Class)</li> <li>- Access Specifiers (public, private, protected, default, private protected)</li> <li>- Doing Inheritance</li> <li>- Constructors in inheritance</li> <li>- Method Overriding</li> <li>- Interface</li> <li>- Nested and Inner Class</li> <li>- Abstract and Final Class</li> <li>- Normal import and Static Import</li> <li>- Introduction to Java API Packages and imp. Classes <ul style="list-style-type: none"> <li>o java.lang</li> <li>o java.util</li> <li>o java.io</li> <li>o java.net</li> <li>o java.awt</li> <li>o java.awt.event</li> <li>o java.applet</li> <li>o java.swing</li> </ul> </li> <li>- java.lang Package Classes (Math, Wrapper Classes, String, String Buffer)</li> <li>- java.util Package Classes (Random, Date, GregorianCalendar, Vector, HashTable, StringTokenizer)</li> <li>- Creating and Using UserDefined package and sub-package</li> </ul>	<b>20</b>	<b>15</b>
<b>3</b>	<b>Exception Handling, Threading and Streams (Input and Output)</b>	<ul style="list-style-type: none"> <li>- Introduction to exception handling</li> <li>- try, catch, finally, throw, throws</li> <li>- Creating user defined Exception class</li> <li>- Thread and its Life Cycle (Thread States)</li> <li>- Thread Class and its methods</li> <li>- Synchronization in Multiple Threads (Multithreading)</li> <li>- Deamon Thread, Non-Deamon Thread</li> </ul> <hr/> <ul style="list-style-type: none"> <li>- Stream and its types (Input, Output, Character, Byte)</li> <li>- File and RandomAccessFile Class</li> <li>- Reading and Writing through Character Stream Classes (FileReader, BufferedReader, FileWriter, BufferedWriter)</li> <li>- Reading and Writing through Byte Stream Classes (InputStream,</li> </ul>	<b>20</b>	<b>10</b>

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		<ul style="list-style-type: none"> <li>FileInputStream, BufferedInputStream, DataInputStream, OutputStream, FileOutputStream, BufferedOutputStream, DataOutputStream)</li> <li>- StreamTokenizer Class</li> <li>- Piped Streams, Bridge Classes : InputStreamReader and OutputStreamWriter</li> <li>- ObjectInputStream, ObjectOutputStream</li> </ul>		
<b>4</b>	<b>Applets</b>	<ul style="list-style-type: none"> <li>- Introduction to Applet</li> <li>- Applet Life Cycle</li> <li>- Implement &amp; Executing Applet with Parameters</li> <li>- Graphics class</li> </ul>	<b>20</b>	<b>10</b>
	<b>Layout Managers</b>	<ul style="list-style-type: none"> <li>- FlowLayout</li> <li>- BorderLayout</li> <li>- CardLayout</li> <li>- GridLayout</li> <li>- GridBagLayout with GridBagConstraints</li> <li>- Intro. to BoxLayout, SprigLayout, GroupLayout</li> <li>- Using NO LAYOUT Manager</li> </ul>		

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<b>5</b>	<b>GUI using SWING Event Handling</b>	<ul style="list-style-type: none"> <li>- Introduction to AWT and Swing</li> <li>- Difference Between AWT and Swing Components</li> <li>- Swing Components <ul style="list-style-type: none"> <li>o JFrame, JPanel</li> <li>o JLabel, JButton, JRadioButton, JCheckBox</li> <li>o JTextField, JPasswordField, JTextArea</li> <li>o JScrollBar, JComboBox, JList <ul style="list-style-type: none"> <li>o Menus (JMenuBar, JMenu, JMenuItem)</li> </ul> </li> </ul> </li> <li>- Introduction to Event Handling</li> <li>- Event Delegation Model</li> <li>- Event Packages <ul style="list-style-type: none"> <li>o AWT Event Package</li> <li>o Swing Event Package</li> </ul> </li> <li>- Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, MouseWheelEvent, TextEvent, WindowEvent, etc.)</li> <li>- Listener Interfaces (ActionListener, ItemListener, FocusListener, KeyListener, MouseListener, MouseMotionListener, TextListener, WindowListener, etc.)</li> <li>- Adaptor Classes (FocusAdaptor, KeyAdaptor, MouseAdaptor, MouseMotionAdaptor)</li> </ul>	<b>20</b>	<b>15</b>
		<b>Total</b>	<b>100</b>	<b>60</b>

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 (2<sup>nd</sup> 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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<b>CS – 20 PROGRAMMING WITH C#</b>				
<b>No</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min Lec.</b>
<b>1</b>	<b>.NET Framework and Visual Studio IDE, Language Basics</b>	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)	<b>20</b>	<b>10</b>

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<b>2</b>	<b>Class and Inheritance, Property, Indexer, Pointers, Delegates, Event, Collections</b>	<p>Concept of Class, Object, Encapsulation, Inheritance, Polymorphism</p> <p>Creating Class and Objects</p> <p>Methods with “ref” and “out” parameters</p> <p>Static and Non-Static Members</p> <p>Constructors</p> <p>Overloading Constructor, Method and Operator</p> <p>Inheritance</p> <p>Sealed Class &amp; Abstract Class</p> <p>Overriding Methods</p> <p>Interface inheritance</p> <p>Creating and using Property</p> <p>Creating and using Indexer</p> <p>Creating and using Pointers (unsafe concept)</p> <p>Creating and using Delegates (Single / Multicasting)</p> <p>Creating and using Events with Event Delegate</p> <p>Collections (ArrayList, HashTable, Stack, Queue, SortedList) and their differences.</p>	<b>20</b>	<b>15</b>
<b>3</b>	<b>Windows Programming</b>	<p>Creating windows Application</p> <p>MessageBox class with all types of Show() method</p> <p>Basic Introduction to Form and properties</p> <p>Concept of adding various Events with event parameters</p> <p>Different Windows Controls</p> <ul style="list-style-type: none"> <li>- Button</li> <li>- Label</li> <li>- TextBox</li> <li>- RadioButton</li> <li>- CheckBox</li> <li>- ComboBox</li> <li>- ListBox</li> <li>- PictureBox</li> <li>- ScrollBar</li> <li>- TreeView</li> <li>- Menu (MenuStrip, ContextMenuStrip)</li> <li>- ToolStrip</li> <li>- Timer</li> <li>- Panel and GroupBox</li> </ul>	<b>20</b>	<b>15</b>



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		Dialog Boxes (ColorDialog, FontDialog, SaveFileDialog and OpenFileDialog) MDI Concept with MDI Notepad Concept of Inheriting Form		
<b>4.</b>	<b>Database Programming with ADO.NET</b>	Concept of Connected and Disconnected Architecture Data Providers in ADO.NET Connection Object Connected Architecture <ul style="list-style-type: none"> <li>- Command</li> <li>- DataReader</li> </ul> Disconnected Architecture <ul style="list-style-type: none"> <li>- DataAdapter</li> <li>- DataSet</li> <li>- DataTable</li> <li>- DataRow</li> <li>- DataColumn</li> <li>- DataRelation</li> <li>- DataView</li> </ul> Data Binding GridView Programming	<b>20</b>	<b>12</b>
<b>5</b>	<b>User Controls (Components), Crystal Reports, Setup Project</b>	Creating User Control with <ul style="list-style-type: none"> <li>- Property</li> <li>- Method</li> <li>- Event</li> </ul> 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"> <li>- File System Editor</li> <li>- User Interface Editor</li> <li>- Launch Conditions Editor</li> </ul>	<b>20</b>	<b>8</b>
		<b>Total</b>	<b>100</b>	<b>60</b>

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

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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

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<b>CS – 21 NETWORK TECHNOLOGY AND ADMINISTRATION</b>				
<b>No</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>Min Lec.</b>
<b>1</b>	<b>Basics of Network, Network Models and LAN Sharing</b>	<ul style="list-style-type: none"> <li>• Network concepts               <ul style="list-style-type: none"> <li>- What is network</li> <li>- Use of network</li> </ul> </li> <li>• Network model               <ul style="list-style-type: none"> <li>-peer – to – peer</li> <li>-client – server</li> </ul> </li> <li>• Network Services               <ul style="list-style-type: none"> <li>- File service,</li> <li>- Print service,</li> <li>- Comm. service,</li> <li>- Data base service,</li> <li>- Security service,</li> <li>- Application service</li> </ul> </li> <li>• Network Access Methods               <ul style="list-style-type: none"> <li>- csma / cd, csma / ca,</li> <li>- Token passing</li> <li>- Polling</li> </ul> </li> <li>• Network Topologies               <ul style="list-style-type: none"> <li>- Bus, Ring, Star, Mesh, Tree, Hybrid</li> </ul> </li> <li>• Advanced □□ Network Topologies Ethernet, CDDI, FDDI</li> <li>• Communication Methods               <ul style="list-style-type: none"> <li>- Unicasting</li> <li>- Multicasting</li> <li>- Broadcasting</li> </ul> </li> <li>• OSI reference model with 7 layers</li> <li>• TCP/IP network model with 4 layers</li> <li>• File And Print Sharing in LAN.</li> <li>• aping of network drive</li> <li>• Disk quota</li> <li>• Encryption</li> <li>• Compression</li> <li>• Net meeting</li> </ul>	20	12

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<b>2</b>	<b>Transmission Media Multiplexing &amp; Switching Concepts Network devices</b>	<ul style="list-style-type: none"> <li>• Transmission Media <ul style="list-style-type: none"> <li>- Types of Transmission media</li> <li>- Guided media</li> <li>- Co – Axial Cable,</li> <li>- Twisted Pair Cable,</li> <li>- Crimping of Twisted pair cable</li> <li>- Fiber Optic Cable</li> </ul> </li> <li>• Unguided media <ul style="list-style-type: none"> <li>- Infrared, Laser, Radio, Microwave, Bluetooth tech.</li> </ul> </li> <li>• Different Frequency Ranges</li> <li>• Multiplexing &amp; Demultiplexing</li> <li>• Multiplexing Types <ul style="list-style-type: none"> <li>- FDM,</li> <li>- TDM,</li> <li>- CDM,</li> <li>- WDM</li> </ul> </li> <li>• Switching Tech. <ul style="list-style-type: none"> <li>- Circuit Switching,</li> <li>- Message Switching,</li> <li>- Packet Switching</li> </ul> </li> <li>• CABLE NETWORK DEVICES</li> <li>• LAYER1 DEVICES <ul style="list-style-type: none"> <li>- LAN CARD,</li> <li>- MODEM ,</li> <li>- DSL &amp; ADSL</li> <li>- HUB(Active,Passive,Smart hub)</li> <li>- REPEATER</li> </ul> </li> <li>• LAYER2 DEVICES <ul style="list-style-type: none"> <li>- SWITCH(Manageable, nonmanagable)</li> <li>- BRIDGE(Source route, Transactional)</li> </ul> </li> <li>• LAYER3 DEVICES <ul style="list-style-type: none"> <li>- ROUTER</li> <li>- LAYER3 SWITCH</li> <li>- BROUTER</li> <li>- GATEWAY</li> <li>- Network Printer</li> </ul> </li> <li>• WIRELESS NETWORK DEVICES <ul style="list-style-type: none"> <li>Wireless switch</li> <li>Wireless router, ACCESSPOINT</li> </ul> </li> </ul>	20	15
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3	<b>Network Protocols, Network Routing</b>	<ul style="list-style-type: none"> <li>• Packets &amp; Protocols</li> <li>• □ Conn. Oriented protocols -TCP&amp; connection less protocols-UDP</li> <li>• TCP/IP STACK <ul style="list-style-type: none"> <li>- HTTP</li> <li>- FTP</li> <li>- SMTP</li> <li>- POP3</li> <li>- SNMP</li> <li>- TELNET</li> <li>- ARP</li> <li>- RARP</li> </ul> </li> <li>• IPX/SPX</li> <li>• AppleTalk,</li> <li>• NetBIOS Name PROTOCOL</li> <li>• L2CAP, RFCOMM Protocol</li> <li>• What is routing</li> <li>• Requirements of routing</li> <li>• Types of Routing <ul style="list-style-type: none"> <li>- static</li> <li>- dynamic</li> <li>- default</li> </ul> </li> <li>• Routing protocols <ul style="list-style-type: none"> <li>- Exterior Routing protocol <ul style="list-style-type: none"> <li>1)BGP</li> </ul> </li> <li>- Interior Routing protocol <ul style="list-style-type: none"> <li>(1)Distance vector routing <ul style="list-style-type: none"> <li>- RIP</li> <li>- IGRP</li> <li>- EIGRP</li> </ul> </li> <li>(2)Link state routing <ul style="list-style-type: none"> <li>- OSPF</li> <li>- IS IS</li> </ul> </li> </ul> </li> </ul> </li> </ul>	20	10
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<b>4</b>	<b>IP ADDRESSING, Windows 2008 server</b>	<ul style="list-style-type: none"> <li>• What is ip address?</li> <li>• Types of ip address</li> <li>• □ ipv4 <ul style="list-style-type: none"> <li>- Class structure</li> <li>- subneting, supernetting</li> </ul> </li> <li>• ipv6 <ul style="list-style-type: none"> <li>- Basic structure of ipv6</li> <li>- Implementation of ipv6</li> </ul> </li> <li>• Migration from ipv4 to ipv6</li> <li>• Installation of 2008 enterprise server</li> <li>• Various editions of windows 2008 server</li> <li>• Installation &amp; Configuration of Active Directory <ul style="list-style-type: none"> <li>- Domains, Trees, Forests concept</li> </ul> </li> <li>• Accounts(User, Group, Computer)</li> <li>• Policy (Security and audit)</li> <li>• Logging Events</li> <li>• MMC(Microsoft Management console)</li> </ul>	20	11
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<b>5</b>	<b>Basics of Network Security, Internet connection &amp; Sharing</b>	<ul style="list-style-type: none"> <li>• Fundamental of Network Security</li> <li>• Requirements of network Security</li> <li>• Policies, Standard, Procedures, Baselines, Guide lines</li> <li>• Security methods <ul style="list-style-type: none"> <li>- Encryption</li> <li>- Cryptography</li> <li>- Authentication</li> </ul> </li> <li>• Security Principle –CIA Model</li> <li>• Basics of Internet</li> <li>• How internet is connecting with computer</li> <li>• Technology related internet <ul style="list-style-type: none"> <li>- Dial up tech.</li> <li>- ISDN network tech.</li> <li>- Lease line tech.</li> </ul> </li> <li>• VPN <ul style="list-style-type: none"> <li>- Types of VPN</li> <li>- Use of VPN</li> <li>- VPN protocols (PPTP, L2TP, IPsec.)</li> </ul> </li> <li>• Proxy server, Firewall</li> <li>• GPS, GPRS</li> <li>• CCTV tech.</li> </ul>	20	12
<b>Total</b>			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

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<b>CS – 22 : Operating Systems Concepts With Unix / Linux</b>				
<b>No</b>	<b>Topics</b>	<b>Details</b>	<b>Marks weight In %</b>	<b>App. Lect</b>
<b>1</b>	<b>Introduction, Process Management, Memory Management</b>	<ul style="list-style-type: none"> <li>• Meaning of OS</li> <li>• Functions of OS</li> <li>• Features of OS</li> <li>• OS Types (User Point of View)</li> <li>• OS Types (Features Point of View)</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Introduction of OS process</li> <li>• Process State Transition Diagram</li> <li>• Process Scheduling               <ul style="list-style-type: none"> <li>○ FCFS</li> <li>○ SJN</li> <li>○ Round Robin</li> <li>○ Priority Base Non Preemptive</li> <li>○ Priority Base Preemptive</li> </ul> </li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Physical Memory and Virtual Memory</li> <li>• Memory Allocation</li> <li>• Contiguous Memory Allocation</li> <li>• Noncontiguous Memory Allocation</li> <li>• Virtual Memory Using Paging</li> <li>• Virtual Memory Using Segmentation</li> </ul>	20	12
<b>2</b>	<b>Getting Started with Unix, Unix Shell Command, Text Editing With vi Editor,</b>	<ul style="list-style-type: none"> <li>• Unix Architecture</li> <li>• Unix Features</li> <li>• Types Of Shell ( C, Bourn, Korn )</li> <li>• Unix File System</li> <li>• Types Of Files               <ul style="list-style-type: none"> <li>○ Ordinary Files</li> <li>○ Directory Files</li> <li>○ Device Files</li> </ul> </li> <li>• Unix File &amp; Directory Permissions</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Connecting Unix Shell : Telnet</li> <li>• Login Commands passwd, logout, who, who am i, clear</li> <li>• 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</li> <li>• Operators in Redirection &amp; Piping               <ul style="list-style-type: none"> <li>○ &lt;</li> <li>○ &gt;</li> <li>○ &lt;&lt;</li> <li>○ &gt;&gt;</li> <li>○  </li> </ul> </li> </ul>	20	17



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		<ul style="list-style-type: none"> <li>• Advance Tools</li> <li>• Finding Patterns in Files grep,fgrep,egrep</li> <li>• Working with columns and fields cut,paste,join</li> <li>• Tools for sorting sort,uniq</li> <li>• Comparing files : cmp,comm.,diff</li> <li>• Changing Information in Files : tr,sed,</li> <li>• Examining File Contents : od</li> <li>• Tools for mathematical calculations bc,factor</li> <li>• Monitoring Input and Output tee,script</li> <li>• Tools For Displaying Date and Time cal,date</li> <li>• Communications telnet,wall,mtod,write,mail,news,finger</li> <li>• Process Related Commands : ps, command to run process in background, nice,kill,at,batch,cron, crontab,wait,sleep</li> <li>• Concept of Mounting a File System mount command</li> <li>• Concept of DeMounting a File System umount command</li> <li>• Introduction of vi editor</li> <li>• Modes in vi</li> <li>• Switching mode in vi</li> <li>• Cursor movement</li> <li>• Screen control commands</li> </ul> <p>Entering text, cut, copy, paste in vi editor</p>		
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3	<b>Shell Programming Getting Started with Linux, Linux Booting</b>	<ul style="list-style-type: none"> <li>• Shell Keywords</li> <li>• Shell Variables</li> <li>• System variables PS2, PATH, HOME, LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK</li> <li>• User variables set, unset and echo command with shell variables</li> <li>• Positional Parameters</li> <li>• Interactive shell script using read and echo</li> <li>• Decision Statements <ul style="list-style-type: none"> <li>○ if then fi</li> <li>○ if then else fi</li> <li>○ if then elif else fi</li> <li>○ case esac</li> </ul> </li> <li>• test command</li> <li>• Logical Operators</li> <li>• Looping statements <ul style="list-style-type: none"> <li>○ for loop</li> <li>○ while loop</li> <li>○ until loop</li> <li>○ break, continue command</li> </ul> </li> <li>• Arithmetic in Shell script</li> <li>• Various shell script examples</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• History of Linux</li> <li>• GNU, GPL Concept</li> <li>• Open Source &amp; Freeware</li> <li>• Structure and Features of Linux</li> <li>• Installation and Configuration of Linux - Using with Ubuntu</li> <li>• Startup, Shutdown and boot loaders of Linux</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Linux Booting Process <ul style="list-style-type: none"> <li>- LILO Configuration</li> <li>- GRUB Configuration</li> </ul> </li> <li>• User Interfaces (GUI and CUI)</li> </ul>	20	16
4	<b>Working with X-Windows (Ubuntu)</b>	<ul style="list-style-type: none"> <li>• Layered Structure of X <ul style="list-style-type: none"> <li>- Window Manager</li> <li>- Desktop Environment</li> <li>- Start Menu</li> <li>- User Configuration</li> <li>- startx Command</li> </ul> </li> <li>• Window Managers <ul style="list-style-type: none"> <li>- GNOME</li> </ul> </li> </ul>	20	7

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		<ul style="list-style-type: none"> <li>- KDE</li> <li>- Purpose of window manager</li> <li>• The KDE Desktop <ul style="list-style-type: none"> <li>- KDE Panel</li> <li>- Desktop Icons</li> <li>- Managing Windows</li> <li>- The KDE Control Panel</li> </ul> </li> <li>• The GNOME Desktop <ul style="list-style-type: none"> <li>- The GNOME Panel</li> <li>- Desktop Icons</li> <li>- Managing Windows</li> <li>- The GNOME Control Panel</li> </ul> </li> <li>• Configuring X <ul style="list-style-type: none"> <li>- /etc/X11/Xorg.conf file</li> <li>- Tuning Xorg.conf</li> <li>- Choosing a Window Manager</li> </ul> </li> <li>• Create, Delete, Rename, Copy files and folders</li> <li>• Install / Uninstall Software</li> </ul>		
5.	<b>Linux Admin (Ubuntu)</b>	<ul style="list-style-type: none"> <li>• Creating Linux User Account and Password</li> <li>• Installing and Managing Samba Server</li> <li>• Installing and Managing Apache Server</li> <li>• Optimizing LDAP Services</li> <li>• Optimizing DNS Services</li> <li>• Optimizing FTP Services</li> <li>• Optimizing Web Services</li> <li>• Configure Ubuntu's Built-In Firewall</li> <li>• Working with WINE</li> </ul>	20	8
<b>Total</b>			<b>100</b>	<b>60</b>

Students seminar - 5 Lectures.  
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.

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<b>CS - 23 : Practical based on CS – 19 &amp; CS – 22</b>		
<b>Sessions</b>	<b>Topics</b>	<b>Marks</b>
I	♦ CS – 19	50
II	♦ CS – 22	50

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

<b>CS - 24 : Practical Based on CS –20</b>		
<b>Sessions</b>	<b>Topics</b>	<b>Marks</b>
I	♦ CS – 20	100

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