Gondwana University, Gadchiroli

Choice Based Credit System (CBCS)

Syllabus
of
Master of Computer Application
(MCA)

Faculty of Science
(Three Years Degree Course)

Computer Science Board

2016-2017
## MCA I (Semester I)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Paper Code</th>
<th>Paper Name</th>
<th>Total Period/Week</th>
<th>Credit</th>
<th>% of Assessment</th>
<th>IA</th>
<th>UE</th>
<th>Total</th>
<th>Min. Passing (40%)</th>
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</thead>
<tbody>
<tr>
<td>Core</td>
<td>PSMCAT101</td>
<td>Java Concepts</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
<td></td>
<td>100</td>
<td>40</td>
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<tr>
<td></td>
<td>PSMCAT102</td>
<td>Operating System and Linux</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
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<td></td>
<td>PSMCAT103</td>
<td>Project Management</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
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<td>100</td>
<td>40</td>
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<tr>
<td>Discipline Specific Elective</td>
<td>PSMCAT104.1</td>
<td>Elective 1. Discrete Mathematical Structure</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
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<tr>
<td></td>
<td>PSMCAT104.2</td>
<td>Elective 2. Numerical Methods</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
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<td>100</td>
<td>40</td>
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<tr>
<td>Skill Enhancement Elective</td>
<td>PSMCAT105.1</td>
<td>Elective 1. Digital Electronics</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>80</td>
<td></td>
<td>100</td>
<td>40</td>
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<tr>
<td></td>
<td>PSMCAT105.2</td>
<td>Elective 2. PC-Maintenance</td>
<td></td>
<td></td>
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<tr>
<td>Core Lab*</td>
<td>PSMCAP106</td>
<td>Lab on PSMCAT101, 102 &amp; 103</td>
<td>6</td>
<td>2</td>
<td>50</td>
<td>50</td>
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<td>100</td>
<td>40</td>
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<tr>
<td>SEE based Lab</td>
<td>PSMCAP107</td>
<td>Lab on PSMCAT105.1 or PSMCAT105.2</td>
<td>6</td>
<td>2</td>
<td>50</td>
<td>50</td>
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<td>100</td>
<td>40</td>
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<tr>
<td>Ability Enhancement</td>
<td>PSMCAS108</td>
<td>Seminar</td>
<td>1</td>
<td>1</td>
<td>25</td>
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</table>

Total 33 25 255 470 725 290

- **Core**: Major theory papers in the concerned subject.
- **Discipline Specific Elective**: These papers will be specialization in the concerned subject.
- **Skill Enhancement course**: Student can choose this paper from any subject.
- From Elective Courses (Either Skill based and Discipline Specific), students need to select one paper form each.
- **IA** (Internal Assessment): It will be evaluated by Internal Examiner appointed by College in consultation with the University. (Refer Appendix 1)
- **UE** (University Examination): It will be evaluated by External Examiner appointed by University. (Refer Appendix 1 & 3)
• **Period:** Each period is of 48 minutes or as per Government direction from time to time.

• **In Paper Code**
  - 1\textsuperscript{st} Letter (P) : Represent it a Post Graduate Course.
  - 2\textsuperscript{nd} Letter (S) : Represent it is Science Faculty
  - Next 3 Letter (MCA) : Represent the Master of Computer Application
  - Next Letter (T/P) : T : Represent Theory Paper (Refer Appendix 1)
    S : Represent Seminar (Refer Appendix 1)
  - Last two letter : Represent Paper No. for Ex. 01 Represent Paper no. 1

• **Lab\textsuperscript{*} :**
  1) Not more than two students should be allowed to do practical on one machine.
  2) Wherever possible Practical’s should be perform using Open Source Software.

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**Note:** Student must appear for University Practical Examination.

**Note:** Direction and Scheme of course is available in the website of Gondwana University, Gadchiroli( [www.gondwana.digitaluniversity.ac](http://www.gondwana.digitaluniversity.ac))
## MCA I (Semester II)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Paper Code</th>
<th>Paper Name</th>
<th>Total Period /Week</th>
<th>Credit</th>
<th>% of Assessment</th>
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<tbody>
<tr>
<td>Core</td>
<td>PSMCAT201</td>
<td>Advanced Java</td>
<td>4</td>
<td>4</td>
<td>20 80 100 40</td>
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<tr>
<td></td>
<td>PSMCAT202</td>
<td>Data Structures</td>
<td>4</td>
<td>4</td>
<td>20 80 100 40</td>
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<tr>
<td></td>
<td>PSMCAT203</td>
<td>Software Testing</td>
<td>4</td>
<td>4</td>
<td>20 80 100 40</td>
</tr>
<tr>
<td>Discipline Specific Elective (DSE)</td>
<td>PSMCAT204.1</td>
<td>Elective 1.Data Warehousing</td>
<td>4</td>
<td>4</td>
<td>20 80 100 40</td>
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<tr>
<td></td>
<td>PSMCAT204.2</td>
<td>2. Client and Server Technologies</td>
<td></td>
<td></td>
<td>20 80 100 40</td>
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<tr>
<td>Skill Enhancement</td>
<td>PSMCAP205</td>
<td>Project</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Core Lab</td>
<td>PSMCAP206</td>
<td>Lab on PSMCAT201&amp;PSMCAT202</td>
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<td>2</td>
<td>50 50 100 40</td>
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<td>DSE based Lab</td>
<td>PSMCAP207</td>
<td>Lab on PSMCAT204.1 Or PSMCAT204.2</td>
<td>6</td>
<td>2</td>
<td>50 50 100 40</td>
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<tr>
<td>Ability Enhancement</td>
<td>PSMCAS208</td>
<td>Seminar</td>
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<td>1</td>
<td>25 - 25 10</td>
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<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>25</strong></td>
<td><strong>255</strong></td>
<td><strong>470</strong></td>
<td><strong>725</strong> <strong>290</strong></td>
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</table>
Pattern of Question Paper

General Rules and Regulations regarding pattern of question paper for the semester end examination is as given below:

1. There will be four units in each paper.
2. Maximum marks of each theory paper will be 80.
3. Question paper will consist of five questions, each of 16 marks.
4. Four questions will be based on four units with internal choice.
5. Fifth question will be compulsory with questions from each of the four units having equal weightage and there will be no internal choice.

Master of Computer Application

<table>
<thead>
<tr>
<th>MCA – [ I / II / III ]</th>
<th>Semester – [ I / II/ III / IV / V ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper Code :</td>
<td>Paper : Name of Paper</td>
</tr>
<tr>
<td>Time: 3 Hours</td>
<td>[ Max. Marks: 80</td>
</tr>
<tr>
<td>Note: 1) All questions are compulsory and carry equal marks.</td>
<td></td>
</tr>
<tr>
<td>2) Draw Neat and Labeled diagram and use supporting data wherever necessary.</td>
<td></td>
</tr>
<tr>
<td>3) Avoid vague answers and write specific points/answer related to questions.</td>
<td></td>
</tr>
</tbody>
</table>

Q1 Either (From Unit 1)

a) 8
b) 8
Or
c) 8
d) 8

Q2 Either (From Unit 2)

a) 8
b) 8
Or
c) 8
d) 8

Q3 Either (From Unit 3)

a) 8
b) 8
Or
c) 8
d) 8

Q4 Either (From Unit 4)

a) 8
b) 8
Or
c) 8
d) 8

Q5 Solve all questions

a)(From Unit 1) 4
b) (From Unit 2) 4
c)(From Unit 3) 4
d)(From Unit 4) 4
Master of Computer Application – I

(Semester I)
Master of Computer Application – I (Semester I)

Paper Code: PSMCAT101
Paper 1: JAVA CONCEPTS

Credit : 4 ] [Max. Marks: 80

Unit - I : Problem Solving Techniques
Problem Analysis, Process Analysis, Conceptual Development of Solution. Development Tools:
Algorithm: Types of Algorithm, Analysis of Algorithm, Advantage and Disadvantage of
Algorithm, Complexity of an Algorithm, Big-O Notation Flowcharts: Types of Flowcharts,
Advantage and Disadvantage of Flowchart. Pseudo Code: Definition and Its Characteristics

Unit - II : Basic Programming concepts of Java
Java Tokens: Identifiers, Keywords, Expressions in Java, Operators; Data Types in Java,
Implementing Java Programs, Java Virtual Machine, Type Casting, Control Structures, Looping
statements, Arrays and its methods, String.

Unit -III : Classes, Objects and Methods
Object Fundamentals and Features, Scope rules, Static data, Static methods, Static blocks, Data
Members and Variable, Abstract Methods and Classes, Overloading, Overriding Methods,
Constructors, Subclasses (Inheritance), Interfaces, Packages, Importing Packages and Classes,
User define packages, Multithreading, Exception Handling.

Unit - IV : Applet & AWT
Applet: Applet Class, Architecture, Life Cycle, Display Methods,<Applet Tag>, and Passing
Parameter to Applet.
AWT: Working with Windows (Frames and Panel), Controls (Label, TextField, Button,
Checkbox, ScrollBar, List, Choice) Layout Managers: Border Layout, Flow Layout, Grid
Layout, Menus.

Text Books:

1. Dr. S. B. Kishor, “PROGRAMMING LOGIC AND TECHNIQUES”, BlackSwan
3. Cay S Horstmann Gary Cornell, “Core JAVA 2 Vol -1, 2”, The Sun Micro Systems Press,
   New Delhi, ISBN- 978-0470105559

Reference Books:


Master of Computer Application – I (Semester – I)
Paper Code : PSMCAT102
Paper 2: OPERATING SYSTEM AND LINUX
Credit : 4 ] [Max. Marks: 80

Unit – I: Introduction to Operating System and CPU Scheduling


Unit – II: Deadlock Management


Unit – III: Introduction to Linux

Structure of Linux Operating System, Exploring the directory structure, Naming files and directories. Shell: Bourne, Korn and C-Shells
File system Commands: ls, mkdir, rmdir, cd, cat, mv, cp, rm, ln, pwd, more.
Text editing with vi editor

Unit - IV: Shell Scripts

Pipe and Filters: sort, grep, egrep Permission modes: chmod, chown, chgrp
Process: ps, kill
Communication
Shell Scripts: Variables, Arithmetic in Shell Script, Control flow statements, Shell Parameters.

Text Books:
2. Dr. S. B. Kishor, “Introduction to Operating System”, Das Ganu Prakashan,2nd Edition,

Reference Books:
Master of Computer Application– I (Semester I)  
Paper Code : PSMCAT103  
Paper 3: PROJECT MANAGEMENT  

Credit : 4 ]  

[Max. Marks: 80 ]

Unit - I : Introduction to Project Management
Introduction to Project Management, Project Process, Importance of a Project Management Process, Project Context, Interpersonal and Behavioral Context, Organizational Context, Success, Role of Project Manager, Common challenges associated with project manager, skill requirements, and functional competencies of project manager.

Unit - II : Initiation of Project Management
Strategic Management and Project Selection- Project Management Maturity, Project Selection and Criteria of Choice, Nature of Project Selection Models, Types of Project Selection Models, Analysis under uncertainty, Project Portfolio Process. The Project Manager, Negotiation and the Management of Conflict, The Project in the Organizational Structure,

Unit - III : Project Planning
Project Activity Planning- Initial Project coordination and the project plan, systems integration, the action plan, WBS, Budgeting and Cost Estimation, Scheduling- Background, Network Techniques: PERT (ADM) and CPM (PDM), Risk Analysis using Simulation with Crystal Ball


Unit - IV : Execution, Control & Report
Execution: Conflicts, Managing Changes in Projects, Resistance to change
Control & Report: Communication, Listening, Reporting, Managing Delays, Escalation, Negotiating Rational Delays, Team Meetings. Project or Phase Close

Text Books:


Reference Books :

Master of Computer Application – I (Semester I)

Paper Code : PSMCAT104.1

Paper 4: DISCRETE MATHEMATICAL STRUCTURE

Credit : 4 | Max. Marks: 80

Unit – I: Mathematical Logic

Unit – II: Relation and Digraph
Relational and Digraphs- Product Sets and Partitions, Relations and Digraphs, The Matrix of a Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations, Computer Representation of Relations and Digraph, Manipulation of Relations, Transitive Closure and Warshall”s Algorithm.

Unit – III: Lattices and Boolean-Algebra
Additional Relations and Structure- Partially Ordered Sets, Lattices, Hasse Diagram, Principle of Duality, Distributive Lattice, Sub Lattice, Complemented Lattice
Boolean-Algebra: Introduction, Functions of Boolean algebra’s, Boolean Function as Boolean Polynomials

Unit – IV: Groups, Languages and Finite State Machines
Languages: Definition, Languages of Machine, Grammar, Derivation Trees
Finite-State Machines: Introduction to Finite State Machine, Moore Machines

Text Books:

Reference Books:
3. RajendraAkerkar ,“Discrete Mathematics”, Publication Pearson
UNIT –I: Roots of Non-Linear Equations

UNIT –II: Linear Equations
Solution to Linear Equations, Existence of solution, Gauss Elimination Method, Gauss elimination with pivoting, Gauss Jordan Method, Round off errors and refinement, m Conditioned system, Matrix inversion method.

UNIT –III: Interpolation
Linear interpolation, Lagrange Interpolation, Spline Interpolation, Interpolation with equidistant points, Least Square regression Fitting, Transcendental equations, Multiple linear regression, m conditioning in Least square

UNIT - IV: Integration and Differentiation

Text Books:
1. Y. Rajaraman, Computer Oriented Numerical Methods - Prentice Hall Publication
2. Gupta and Kapoor Fundamental of Mathematical Statistics

Reference Books:
1. SSastry Introduction to Numerical Analysis
2. Srimanta Pal Numerical Methods (Oxford)
3. KSankaraRao Numerical Methods for Scientists & Engineers.
4. ManishGoyal Computer Based Numerical And Statistical Techniques (Laxmi)
Unit –I: Number System and Data Representation

**Number System:** Binary, Octal, Decimal and Hexadecimal Number System and their Inter Conversion. **Binary Codes:** BCD, Excess3, Parity, Gray, ASCII, EBCDIC Codes and their Advantages and Disadvantages. **Data Representation:** Positive, Negative, Maximum and Minimum Number Representation (Related to 8 bit Number), Real Number Representation, Underflow, Overflow, Range and Accuracy.

Unit – II: Binary Arithmetic

**Binary Arithmetic:** Binary Addition, Decimal Subtraction Using 9’s and 10’s Complement, Binary Subtraction Using 1’s and 2’s Complement, Multiplication and Division.

**Logic Gates:** Truth Table, Properties and Symbolic Representation of NOT, AND, OR, NOR, NAND, EX-OR, EX-NOR Gates. NOR and NAND Gates as Universal Gates.

Unit - III : Boolean Algebra and Combinational Circuits

**Boolean Algebra:** Laws and Identities of Boolean Algebra, Demorgan’s Theorem, Use of Boolean Algebra for Simplification of Logic Expression, K-Map for 2,3,4 Variables, Simplification of SOP and POS Logic Expression Using K-Map.

**Combinational Circuits:** Half Adder, Full Adder, Parallel Adder, Half Subtractor, Full Subtractor, 4-Bit Binary Adder Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder, Parity Detector.

Unit – IV: Sequential Circuits and Counters

**Sequential Circuits:** Flip-Flops Construction and Working of RSFF, JKRSFF, DFF, TFF, JKFF and JKMSFF. **Counters:** Construction and Working of Asynchronous, Synchronous, Up-Down Counter, Shift Registers and Their Types, Ring Counter, Johnson Counter with their Time Diagram.

Text Books:

Reference Books:
Master of Computer Application - I (Semester - I)  
Paper Code : PSMCAT105.2  
Paper 5: PC MAINTENANCE  

[Max. Marks: 80]

Unit - I : Preventive Maintenance  

Unit – II: CPU and Monitor  
History and Study of Different Types of CPUs, Terminology Used with CPU, Data Processing Inside CPU, RAM & ROM, Different Types of ROM, Virtual Memory, Installing and Removing Memory, Video Cards and Monitors, Display Resolution, Feature, Video Driver, CTs Working, LCDs Working, Monitor Resolution, Interfacing, Refresh Rate, Monitor Driver, Adjusting Display Settings in Windows.

Unit –III: Study of Drives  

Unit – IV: Study of Printer, Formatting and Trouble Shooting  

Text Books:  
2. Basics of Computer Hardware –BPB Publication  

Reference books:  
1. Microprocessor and Interfacing by Douglas Hall.  
2. Inside the IBM PC by Peter Norton.
Master of Computer Application – I (Semester – I)
Practical
Paper Code : PSMCAP106

Credit : 2 ] [Max. Marks: 100

Practical List on JAVA Concepts

1. Write a java program to find largest among three numbers.

2. Write a java program to check whether seller made or loss, if sales price and purchase price is inputted through keyboard.

3. Write a program to accept two numbers and display result using command Line argument.

4. Write a program for sorting a list of number using Array.

5. Write a java program to print following output.

   A
   A B
   A B C
   A B C D
   A B C D E

6. Write a java program to no. of evens and no. odd numbers in an array of size 10. Also calculate sum of evens and sum of odds.

7. Write a java program to find sum of prime numbers ranges from 1 to 100.

8. Write a program to calculate multiplication and division using static method.

9. Write a program of Constructor Overloading to calculate Area of Room.
   i. Default constructor
   ii. Constructor with one argument.
   iii. Constructor with three arguments.

10. Write a program to demonstrate Single Inheritance.

11. Write a java program to create a class “Student” with rollno, sub1, sub2, sub3 as data members and get Data() and print Data() as member functions.

12. Write a program to calculate Area of rectangle and circle using Interface.

13. Design a Interface “MyInter” and add two methods sum() and mult() for two integers in it.

14. Write a java program to demonstrate the try…catch mechanism.

15. Write a java program to show use of throw, throws and finally keyword.

16. Write a program which throws IO Exception.(Accept student Name and age from keyboard and display.

17. Write a program to demonstrate user defined exception (use division of two no's & throw user define exception if result is smaller than 0.01)

18. Write a java program to demonstrate Threads using Thread class and also with Runnable interface.

19. Write a java program which shows the use of synchronization.
20. Write an AWT program to accept user's details.
21. Write a Swing Program to create Student Admission Form using various controls.
22. Write a program to demonstrate Event Handling.
23. Write an Applet program to create Login page having Username and Password.
24. Design a user interface using applet which accepts a number and program will calculate square and cube of given number and also display in respective textbox.
25. Design a user interface using applet to accept two values and calculate sum of these numbers.

**Practical List Based on LINUX**

1) Perform the following Directory Commands  
   a) pwd  b) ls  c) mkdir  d) cd  e) rmdir  
2) Perform the following File management Commands  
   a. Cat  b) cp  c) ln  d) rm  e)more  f) mv  
3) A Shell Script to perform various arithmetic operations.  
4) A Shell Script that takes two numbers from keyboard and display their average as an output.
5) A Shell Script to display current date, users who have logged in, process status and calendar of the month.

**Practical List of Project Management**

*(Note: Practical’s can be performed either in MS Project 2013 or Wrike (Open Source Software) can be used by Student’s)*

**ABOUT PRACTICALS**

This practical has two objectives:

- To give you basic practice in using MS-Project/Wrike, by planning simple projects that you are already familiar with; and
- To provide an introduction to MS-Project/Wrike so that you may use it “in anger” to support your main assignment.

There are 2 main tasks:

1. Using the examples, you can use MS-Project/Wrike to conduct basic tasks in project planning.
2. Based on what you have done so far in manually planning it is used in MS-Project/Wrike to:
   - construct a project plan, then
   - produce a Gantt Chart and network diagram, and
   - estimate the total project duration, taking account of resource constraints, etc.
1. Write the steps to create new project with global settings.
2. Create a Project in MS Project/Write for building home construction.
3. Create a Project in MS Project/Write for creating project management life cycle.
4. Create a Project in MS Project/Write for creating activities (tasks) in system testing plan.
5. Create a project using MS Project/Write to relate small set of tasks related to the initial phases of a system testing plan.
6. Create a project to show linking of tasks with each other.
7. Create a project to assign the resources to tasks in MS Project/Write.
8. Create a project to show all the phases of SDLC with linking of tasks.
9. Create a project in MS Project/Write to show milestones in project.
10. Create a project in MS Project/Write to assign the resources and cost estimation.
Practical list of DIGITAL ELECTRONICS

1) To Study and Design the characteristics of basic gates (AND, OR, NOT).
2) To Study and Design the characteristics of Universal gates (NAND, NOR).
3) To Study and Design the Derived gates (EX-OR, EX-NOR)
4) To Study and Design the basic gates (AND, OR, NOT) using Universal NAND gate.
5) To Study and Design the basic gates (AND, OR, NOT) using Universal NOR gate.
6) To Study and Design the basic gates (EX-OR, EX-NOR) using Universal NAND gate.
7) To Study and Design the derived gates (EX-OR, EX-NOR) using Universal NOR gate.
8) To Study and Design NOR gate using NAND gate.
9) To Study and Design NAND gate using NOR gate.
10) To Study and Design RS FLIP FLOP using NAND gate.
11) To Study and Design RS FLIP FLOP using NOR gate.
12) To Study and Design JK FLIP FLOP.
13) To Study and Design JKMS FLIP FLOP.
14) To Study and Design the Half-adder.
15) To Study and Design the Full-adder.
16) To Study and Design the Half subtractor.

Practical list PC Maintenance and Troubleshooting

1) Study of various Input devices.
2) To study and Installation of Keyboard.
3) To study and Installation of Mouse.
4) Study of various Output devices.
5) To study and Installation of Scanner.
6) To study and Installation of Printer.
7) To study and Installation of Multimedia.
8) Study of different operating system.
9) Study of booting process.
10) To study assembling and disassembling the PC.
11) To study and Installation of configuring motherboard.
12) To study and Installation of VGA adaptor.
13) To study and Installation of SMPS.
14) To study and Installation of Software.
15) To study and Installation of antivirus software.
16) Procedure to cleanup Disk, Disk fragmentation.
Master of Computer Application – I

(Semester II)
Master of Computer Application – I (Semester II)

Paper Code : PSMCAT201
Paper 1: ADVANCE JAVA

Credit : 4 ] [Max. Marks: 80

Unit – I: Introduction to Swing & JDBC:

JDBC: Introduction: JDBC Architecture, Types of Drivers, Statement, ResultSet. Sample example of JDBC connectivity with MS-Access and ORACLE.

Collection Classes: List, Linked List, Vector, Hash Set, Tree Set, interface such as comparator and iterator.

Unit – II: SERVLETS:

Unit – III: JSP:
Introduction to JSP: Jsp Life Cycle, Jsp Implicit Objects & Scopes, Jsp Directives (page, include, taglib), Jsp Scripting Elements (declarative, scriptlets, expressions), Jsp Actions, Custom Actions(Classic Tags, Simple Tags). Server-Tomcat and Weblogic.

Unit – IV: Hibernate
Introduction to Hibernate: ORM (Object Relational Mapping), Configuration xml file and Mapping xml file along with DTDs, Hibernate architecture, Installation and Directory Structure, Hibernate Data Types. Sample Application using Hibernate, Hibernate API, CRUD operations, Primary key Generators, Hibernate Query Language (HQL), Native SQL, Advantages of Hibernate compared to JDBC.

Text Books:
2. Hibernate in Action (In Action series) by Christian Bauer and Gavin King

Reference Books:
Master of Computer Application – I (Semester II)
Paper Code : PSMCAT202
Paper 2 : DATA STRUCTURES

Credit : 4 ] [Max. Marks: 80

Unit - I : Introduction to Data Structures

Unit - II : Recursion, Queues and Link List
Linked List- Introduction, Dynamic Memory Management, Definition of Linked List, Application of Linked List, Representation of Linked List, Types of Linked List.

Unit - III : Tree and Graphs
Trees- Introduction, Definition of Trees, Binary Tree, Type of Binary Tree, Operation on Binary Tree, Traversal of Binary Tree, Binary Search Tree (BST), Expression Trees, Memory Representation of Binary Tree, Threaded Binary Tree, AVL Tree, B-Tree.
Graphs: Definition of Graph, Various Terminology Used in Graph, Sequential Representation of Graph, Path Matrix, Spanning Tree, Minimum Spanning Tree (Kruskal Algorithm, PRIM'S Algorithm), Traversing a Graph

Unit - IV : Sorting and Searching
Sorting- Definition of Sorting, Classification of Sorting, Stability, Comparison of Sorting Method, Bubble Sort, Sequential Sort, Insertion Sort, Selection Sort, Merge Sort, Shell Sort, Radix Sort, Heap Sort, Quick Sort, Topological Sorting.
Searching- Definition, Type of Searching (Linear / Binary / Soundex).

Text Books:

Reference Books:

Master of Computer Application – I (Semester II)
Paper Code: PSMCAT203
Paper 3: SOFTWARE TESTING

Credit: 4 ]

[Max. Marks: 80]

Unit – I: Introduction to Software Testing


Unit – II: Testing Levels and Types


Unit-III: Dynamic & Managing Testing Techniques.


Unit-IV: Software Testing Tools & Code of Ethics

Software Testing Tools – Need for Tools, Classification of tools, benefits of tools, risk associated with tools, selecting tools, introduction to tools in testing process. Code of Ethics for Software Professionals – Human ethics, professional ethics, ethical issues in software engineering

Text Books:


Reference Books:


Master of Computer Application - I (Semester – II)

Paper Code: PSMCAT204.1

Paper 4: DATA WAREHOUSING

Credit : 4 ] [Max. Marks: 80

Unit – I: Data Warehouse and OLAP

Introduction to Data Warehousing: Characteristics of a Data Warehouse, Data Warehouse Architectural Strategies, Design Considerations, Data Content, Building a Data Warehouse, Metadata, Tools for Data Warehousing, Performance Considerations, Crucial Decisions in Designing a Data Warehouse. Various Technological Considerations: OLTP and OLAP Systems, Data Modeling, Categories of OLAP Tools, Managed Query Environment (MQE), OLAP Tools and Internet.

Unit – II: Data Mart and Data Mining Tools

Data Mart: Data Mart, Type of Data Mart, Loading a Data Mart, Metadata for a Data Mart, Data Model for a Data Mart, Software Component for a Data Mart, Tables in Data Mart, Security in Data Mart. Data Mining and Tools: Introduction, From Data Warehouse To Data Mining, Steps of Data Mining, Data Mining Algorithm, Database Segmentation, Predictive Modeling, Link Analysis, Tools for Data Mining.

Unit – III: SQL Basic, Create, Modify and Retrieve Database Objects

SQL Basic Concept and Principles: SQL Language, Role of SQL, SQL Feature and Benefits, Relational Database and SQL, Fundamental SQL Concepts and Principle, SQL Data Types, Constants, Operators, Expressions, SQL Functions and Data Integrity. Creating, Modifying and Retrieving Database Objects: Data Definition Language, Data Manipulation Language, Table, Index, Views, Aliases, Synonyms, Schemas and Sequences, Data Queries – Select Statement, Query Result, Single Table, Multiple Table Queries, Types of Clause, Types of Joins, Sub Queries and Queries Expression.

Unit – IV: Transaction Processing, Database Security and PL/SQL


Text Books:

Reference Books:

**Master of Computer Application - I (Semester – II)**

**Paper Code**: PSMCAT204.2

**Paper 4: CLIENT AND SERVER TECHNOLOGIES**

**Credit : 4**

[Max. Marks: 80]

**Unit - I : Client Server Computing Concepts**

Introduction to client / server computing Main frame – Centric client / server computing – Downsizing and client / server computing – Preserving mainframe application – Investment through porting – Client / server development tools – Advantages of Client / Server computing.

**Unit - II : Components of Client Server Environment**

Client Component : Components of client / server application – The client – Client service, request for services, RPC, windows services, Fax / print services, Remote boot services, other remote services – Utility embedding – Common request broker architecture (CORBA) – Server Component: The server - Detailed server functionality – The networking operating system – Novell network – LAN manager – IBM LAN server – Banyan VINES-PC network file services.

**Unit - III : Client Server Platforms**

Server operating system : Netware, OS/2, Windows NT, Unix – System Application architecture (SAA) – Connectivity – Open systems interconnect (OSI) process communication (IPC) – Communication interface technology, Wide area network technology.

**Unit - IV : Client / Server Development Software**


**Text Books :**

2. Designing Enterprise Client/Server Systems by Beth Gold – Bernstein, David Marca PHI.
3. Client / Server Communications by Thomas S Ligon, TMH.

**Reference Books:**

Master of Computer Application – I (Semester – II)

Paper Code :PSMCAP205

Project

Credit : 4 ] [Max. Marks: 100

Instruction:
Towards the end of the second semester of study, a student will be examined in the course “Project Work”.

a. Project Work may be done individually or in groups (Maximum 2 students) in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to monitor the progress of individual student.
b. The Project Work should be done using the tools covered in Master of Computer Application

c. The Project Work should be of such a nature that it could prove useful or be relevant from the System-oriented/Application/commercial /management angle.
d. The project work will carry 100 marks.
e. The external viva-voce examination for Project Work would be held as per the Examination Time Table of the second year of study, by a panel of one external and one Internal examiner.
f. Internal Examiner must reject any project title which was already carried out in any computer course in the college using same tools.

Types of Project
It is suggested that the project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution. The Applications Areas of project may be – Financial/Marketing/Database Management System/ Relational Database Management System/E-Commerce/Internet/ Manufacturing/ Web Designing/Hardware and Software interaction based etc.

Project Proposal (Synopsis)
The project proposal should be prepared in consultation with the guide/co-guide. The project proposal should clearly state the objectives and environment of the proposed project to be undertaken. It should have full details in the following form:

1. Title of the project
2. Objectives and Hypothesis of the Project
3. Project Category (DBMS/RDBMS/OOPS/Web Designing/Internet etc.)
4. Tools/Platform, Languages to be used
5. A complete Structure of the program:
   i. Analysis.
   ii. Numbers of Modules.
   iii. Data Structures or Tables
   v. Types of Report Generation.
   vi. Scope of future Application.
**Project Report Formulation** : In General, project report must consist of following. Depending upon the kind of project one may alter the following sequence in consultation with guide.

1. Title Page.
3. Declaration Page.
5. Indexor Content Page.
6. Documentation.
   i. Introduction/Objectives.
   ii. Preliminary System Analysis.
      - Identification of Need.
      - Preliminary Investigation.
      - Feasibility Study.
      - Need of New System.
      - Flaws in Present System.
   iii. Project Category.
   v. Detailed System Analysis.
      - No. of Modules with title of module.
      - Data Structures and Tables if any used in project.
      - Entity-Relationship Diagram if any used in project.
   vi. System Design.
      - Source Code.
      - Input Screen & Output Screen.
   vii. Validation Checks.
   viii. Implementation, Evaluation and Maintenance.
   x. Future Scope of the project.
   xi. Bibliography

Appendix
o Survey Questionnaire
Master of Computer Application – I (Semester – II)
Practical
Paper Code : PSMCAP206

[Max. Marks: 100]

Practical list for Advance Java

1. Write a program to create a frame using JFrame class
2. Write a program to create Frame and add any component on it.
3. Write a program to create a login form and implement WindowListener.
4. Write a program to demonstrate the any one layout manager class.
5. Write a program to demonstrate Linked List class.
6. Write a program to demonstrate List class.
7. Write a program to demonstrate Vector class.
8. Write a program to demonstrate connectivity with MS-Access/Oracle.
9. Write a program to demonstrate HttpServlet class.
10. Write a program to retrieve the data from comparator interface.
11. Write a program to create servlet which display the message as a “Hello Servlet”.
12. Write a program to demonstrate servlet life cycle methods.
13. Implement a servlet which counts the no. of Hits.
14. Write an HTML page which inputs the below mentioned fields and invoke the java servlet program which enters the fields in the database table Fields: Roll_no ,Name , Department , Email_id.
15. Write a program to demonstrate JSP Life cycle methods.
16. Implement simple JSP page which display the message as “My First JSP Page”.
17. Write one HTML page that will ask user for login. When user submit this HTML page, run JSP on server which will make query in database to check whether username & password are correct or not.
18. Implement simple JSP page to demonstrate JSP action.
19. Implement simple JSP page to demonstrate Custom action.
20. Write a program to access the database through JSP.
Practical List of Data Structure

1. Write an algorithm and program in C++ to delete an element from n\textsuperscript{th} position from an array.
2. Write an algorithm and program in C++ to insert an element at n\textsuperscript{th} position in an array.
3. Write an algorithm and program in C++ for Push and pop operation on stack using array.
4. Write an algorithm and program in C++ that uses a recursive function for solving Towers of Hanoi problem.
5. Write an algorithm and program in C++ for Insertion and deletion operation in queue using array.
6. Write an algorithm and program in C++ for Insertion and deletion operation in priority queue using array.
7. Write an algorithm and program in C++ for creation, insertion and deletion in LinkedList.
8. Write an algorithm and program in C++ to count number of elements in linked list.
9. Write an algorithm and program in C++ for Creation of Binary search tree.
10. Write an algorithm and program in C++ for Insertion and deletion of node in Binary search tree.
11. Write an algorithm and program in C++ for Traversal of Binary search tree (inorder, preorder, postorder)
12. Write an algorithm and program in C++ to implement Kruskal’s Algorithm.
13. Write an algorithm and program in C++ to implement Prim’s Algorithm
14. Write an algorithm and program in C++ to sort an array using Bubble sort.
15. Write an algorithm and program in C++ to sort an array using Quicksort.
16. Write an algorithm and program in C++ to sort an array using Selection sort.
17. Write an algorithm and program in C++ to search an element in an array using Linear search.
18. Write an algorithm and program in C++ to search an element in an array using Binary search.
19. Write an algorithm and program in C++ to sort an array using Mergesort.
20. Write an algorithm and program in C++ to enter ‘n’ numbers in a file, after entering read a file and categorize the numbers in two files as even and odd numbers.
**Practical List of Software Testing**

1. Understand The Automation Testing Approach (Theory Concept)

2. Using SeleniumIDE, Write testsuite containing minimum 2 test cases.

3. Conduct testsuite for any two websites.

4. Write and test program to login in a specific webpage.

5. Write and test program to provide total number of objects present/available on the page.

6. Study of any testing tool (e.g. Win runner)

7. Study of any web testing tool (e.g. Selenium)

8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)

9. Study of any test management tool (e.g. Test Director)

10. Study of any open source-testing tool (e.g. Test Link)
Master of Computer Application – I (Semester – II)
Practical
Paper Code: PSMCAP207

Credit : 2 ] [Max. Marks: 100

Practical on SQL
A. Create table DONAR with following fields (Dno, Dname, City, Age, Sex, BG, Quantity, date).
B. Insert the following records into the table DONAR.

<table>
<thead>
<tr>
<th>Dno</th>
<th>Dname</th>
<th>City</th>
<th>Age</th>
<th>Sex</th>
<th>BG</th>
<th>Quantity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>RAJESH RAO</td>
<td>CHANDRAPUR</td>
<td>28</td>
<td>M</td>
<td>O+ve</td>
<td>100</td>
<td>25-AUG-11</td>
</tr>
<tr>
<td>102</td>
<td>ANAND SHARMA</td>
<td>NAGPUR</td>
<td>20</td>
<td>M</td>
<td>O+ve</td>
<td>200</td>
<td>26-AUG-11</td>
</tr>
<tr>
<td>103</td>
<td>VISHAL DESHPANDE</td>
<td>HYDERABAD</td>
<td>23</td>
<td>M</td>
<td>O-ve</td>
<td>250</td>
<td>26-AUG-11</td>
</tr>
<tr>
<td>104</td>
<td>SHRUTI RAKHUNDE</td>
<td>CHANDRAPUR</td>
<td>22</td>
<td>F</td>
<td>A+ve</td>
<td>100</td>
<td>27-AUG-11</td>
</tr>
<tr>
<td>105</td>
<td>ANUSHREE DHAKATE</td>
<td></td>
<td>22</td>
<td>F</td>
<td>A-ve</td>
<td>200</td>
<td>26-AUG-11</td>
</tr>
<tr>
<td>106</td>
<td>VIJETA DHAKATE</td>
<td>BALLARPUR</td>
<td>22</td>
<td>F</td>
<td>O+ve</td>
<td>100</td>
<td>25-AUG-11</td>
</tr>
<tr>
<td>107</td>
<td>AAMIR TAJA</td>
<td>CHANDRAPUR</td>
<td>21</td>
<td>M</td>
<td>O+ve</td>
<td>250</td>
<td>27-AUG-11</td>
</tr>
<tr>
<td>108</td>
<td>AMIR KHAN</td>
<td>DURGAPUR</td>
<td>25</td>
<td>M</td>
<td>O+ve</td>
<td>100</td>
<td>25-AUG-11</td>
</tr>
</tbody>
</table>

C] Perform following queries on above table.

1. Find all donars whose name starts between alphabets ‘A’ to ‘S’.
2. Find all donars who belongs to city CHANDRAPUR.
3. Find all donars who does not belongs to CHANDRAPUR city.
4. Find all donars who belongs to either CHANDRAPUR or NAGPUR city.
5. Find all donars whose city value contains NULL.
6. Arrange all donars in the sorted order whose age is between 18 and 22.
7. Find all male donars.
8. Find all male donars having O+Ve blood group.
9. Find all donars who donated the blood between 25-AUG-10 and 26-AUG-11.
10. Find all donars who donated more than 100 ml of blood.
11. Find all female donars who belong to city CHANDRAPUR having blood group ‘O+Ve’ in the sorted order of city?
12. Display all donars according their age.
13. Display the donar list in recent order of donation date.
14. Display all distinct blood group type.
15. Update the age of all donars by 1.
16. Mr. RAJESH RAO changed his name as RAMESH RAO and he is shifted to DURGAPUR. Note the above changes in the table.

17. Due to certain reason all the donars who donated the blood on date ‘26-AUG-11’ are rejected. Hence delete their information.

18. Find the donars names whose first name starts with letter ‘A’ and ends with ‘D’ irrespective of case letter.

19. Find the donar names whose last name starts between alphabets ‘D’ to ‘S’ (Ex. DESPANDE, SHARMA)

20. Find total number of donars having O+Ve group.

21. Find total quantity of blood of group A+Ve.

22. Average age of female donar of O+Ve group by rounding the age to next digit.

23. Display all donars who name pronounces like ‘AAMIR’;

24. Find the donars who donated the blood in the month of AUG.

25. Find the donars who donated the blood on 15th Aug. of year.

Functions

Perform following queries on table donar (Functions)

- Find the donar names whose first name starts with letter ‘A’ and ends with ‘D’ irrespective of case letter.
  (Ex. ANAND) Hint: Use SUBSTR and INSTR function to extract first name.

- Find the donar names whose last name starts between alphabet ‘D’ to ‘S’
  (Ex. DESHPANDE, SHARMA)
  Hint: Use SUBSTR and INSTR function to extract first name.

- Find total number of donars having O+ve group.

- Find total quantity of blood of group A+ve.

- Average age of female donar of O+ve group by rounding the age to next digit.
  Hint: use Ceil function to round the age to next digit.

- Display all donars who name pronounces like ‘AAMIR’;

- Find the donars who donated the blood in the month of AUG.

- Find the donars who donated the blood on 15th Aug. of year.

- Display all donar names in lowercase.

- Find donars whose first name is five characters long.

- Find every 3rd donar in the list. Donar numbers are assigned as consecutive no.
  Hint: …………. where mod (dno,3) = 0
Practical on (PL/SQL)

1) Create following Tables and Execute the respective PL/SQL blocks.
   - Create table employee with the fields (empno, ename, job, hiredate, jadate&sal).
   - Create table Math with fields (numb, square, cube &square_root).
   - Create table Patient with fields (pname, age, prescription).
   - Create table Musicalbum with fields (title, hero, singer, qth).
   - Create table Stu with fields (name & marks).
   - Create table errorh with fields (error_no& description).
   - Create a table DONAR where following fields(Donar no., donar name, city, age, Sex, Blood group, quantity of blood given, date of donation)

2) Write a PL/SQL block to accept employee number and display his/her job, joining date and salary of employee. Define the variable using % rowtype.

3) Write a PL/SQL block to accept three paper marks and display result if student scores more than 35 marks in each paper and also specify the class.

4) Write a PL/SQL block to find the square, cube, square root of nos.bet 1 & 25 using loop.

5) Write a program to divide a number by character number. If any error occurs it should be handled properly, and store the error number and its description in a table called errorh.

6) Write a PL/SQL block to accept and insert a valid data into the table patient. Write appropriate user defined exception.

7) Write a PL/SQL block, to display only title and quality of all album stored in the table music album.

8) Write a PL/SQL to delete the records from table music album where quantity is less than 4 using cursor.

9) Write a PL/SQL block to display the employee all having salary>some value. The value some value can be passing during execution or through bind variable.

10) Write a PL/SQL block to accept the title and display other information; it must handle the exception properly.

11) Write a procedure to swap two numbers.

12) Write a procedure to insert values into a table stu. Write a PL/SQL, main program to call the procedure stu_insert.

13) Write a function which is able to perform addition of two numbers.

14) Write a function which is able to perform addition of two numbers as well as addition of three number using default argument concepts.

15) Write a package, which contain two procedures.

16) A procedure which display the data of stu.

17) A procedure which store the data into the table stu.

18) Write trigger before inserting or updating a name into the table stu name will be automatically converted into uppercase.

19) Write a trigger on a table stu, that whenever user try to insert a marks of math either less than zero or greater than 100 a trigger must fire before insertion or updating of records.
20) Use DONAR table and write a PL/SQL block to accept donar number and display the donar detail and find how many days it pass from the last donation.

21) Write a PL/SQL block to accept donar number, donar name, city, age, sex, blood group, quantity and date of donation and store the data into the table DONAR. Use user defined exception for handling various exception like donar name should not be blank, age of donar should be at least 18 years and so on. Also use STORAGE_ERROR exception to check storage is available or not.

22) Write a PL/SQL block to accept donor name and display the information of donor. If duplicate or no donor found then proper exception should be raised.

23) Create a procedure that displays the information of donor by accepting donor number.

24) Write a trigger which will not allow the user to work on table DONAR during period say 9 am to 9:30 am, on any day.

25) Write a trigger on a table Donor, that whenever user try to insert a quantity greater than 500 ml a trigger must fire before insertion or updation of records.