RAJASTHAN TECHNICAL UNIVERSITY, KOTA

RTU MCA SYLLABUS – YEAR-I (SEMESTER – I)

Bridge Course - Fundamentals of Computer Science [As per Choice Based Credit System (CBCS) Scheme) MCA Year 1 Semester I-BRIDGE COURSE			
Subject Code MCA-B00			
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**100**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 0			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Introduction to Computers: Characteristics of computers, Evolution of computers, generation of computers, classification of computers, applications of computers. **Input and Output Devices:** Keyboard, pointing devices, speech recognition, digital camera, scanners, optical scanners. Classification of output devices, Hard copy output devices- printers, plotters, computer output microfilm (COM), Classification of output devices, Soft copy output devices- monitors, audio output, projectors, and terminals. **Computer System:** Central processing unit (CPU), Memory, instruction format, instruction set.	
Unit-2	**08 Hours**
Primary and Secondary Memory: Memory hierarchy, Random access memory (RAM), types of RAM, Read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk. **Number Systems:** Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases, Alphanumeric- EBCDIC and ASCII, Sets Theory, Types of Sets, Multi Sets, Operations on Sets	
Unit-3	**08 Hours**
Computer Program: Introduction, developing a program, algorithm, flowchart, pseudo code. **Computer Languages:** Introduction, classification of programming languages, generations of programming languages, features of a good programming language. **Computer Software:** Software definition, relationship between software and hardware, software categories, system software, application software, utility software.	
Unit-4	**08 Hours**

Operating System: Introduction of operating system, types of operating system, functions of an operating system, modern operating systems. **Data Communication and Computer Network:** Introduction, data communication, transmission media, multiplexing, switching, computer network, network topologies, communication protocols, network devices. **Internet Basics:** Introduction, evolution of Internet, basic Internet terms, getting connected to Internet, Internet applications, electronic mail and other Internet Services, searching the web (search engines), languages of Internet, viruses. Use of Anti-Virus software.	
Unit-5	**08 Hours**
Office Management Tools **MS-Word:** Creating Saving documents, Entering, Editing, Page formatting, Finding and replacing text, Spell checking and Grammar checking, Indexing, Columns, Tables and feature there in, Inserting (Objects, picture, files etc.), Using Graphics, using Mail Merge, using Word Art, customizing MS Word. **MS Excel:** Spreadsheet terminology, organization of the worksheet area, editing cells using commands and functions, formatting worksheet, creating & editing charts, naming range and using statistical, mathematical and financial functions, multiple worksheets and Macros, working with objects, Worksheet printing options. **MS Power Point:** Anatomy of a power Point Presentation, Creating and Viewing a presentation, Managing Slide Shows, Using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, adding graphics, multimedia and special effects, creating presentation for the web. **MS Access:** Planning a database (tables, queries, forms, reports), Creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, maintaining database, Sorting and Indexing database, Querying a database and generating Reports, modifying a Report.	

Text Books:

1. Computer Fundamentals by P.K. Sinha, BPB Publication.
2. Fundamental of Computers Anita Goel, Pearson Education.
3. RajaramanV.– Fundamentals of Computers, Prentice Hall of India Pvt. Ltd.
4. MS-Office, Dr. S.S. Shrivastava, Published by Laxmi Publication.

Reference Books:

1. Computer Fundamentals and Programming in C, Reema Thareja, OXFORD University Press.
2. Introduction to Computer,Peter Norton's, Tata McGraw Hill Publication.
3. Office 2019:In Easy Steps,Michal Price ,BPB Publication.
4. Windows 8 & Office 2010, Andy Rathbone , Dummies

Bridge Course -C Programming Lab [As per Choice Based Credit System (CBCS) Scheme) MCA Year 1 Semester I-BRIDGE COURSE			
Subject Code MCA-B01			
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**100**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 0			
Lab Experiments			
1. Basic C Programming:-Data types, Tokens, Keywords, Operators 2. Control Statements:-Programs on if, if-else, ladder,Switch, iterative statements-for, while, do-while. 3. Functions: - Programs on Functions. 4. Arrays:-Programs on Arrays. 5. Pointer:- Programs on Pointer. 6. Structures and Union. 7. Dynamic Memory allocation Programs on File Handling.			

Mathematical Foundations in Computer Science
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-101**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**

Credits: 03

CONTENTS	**Teaching Hours**
Unit-1	**08 Hours**
Matrices: Introduction, Rank of Matrix, Solving System of Equations, Inverse of a Matrix, Set theory, Principle of inclusion and exclusion, partitions, Permutation and Combination, Relations, Properties of relations, Matrices of relations, Closure operations on relations, Functions- injective, subjective and objective functions.	
Unit-2	**08 Hours**
Probability: Probability Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence problems. Introduction to Statistics- Population, Sample, Variable, Descriptive Statistics-Mean, Mode, Median, Measures of Spread-Range, Inter Quartile Range, Variance, Standard Deviation.	
Unit-3	**08 Hours**
Propositions & Propositional Calculus: Propositions and logical operators, Truth table, Propositions generated by a set, Equivalence and implication, Basic laws, Functionally complete set of connectives, Normal forms, Proofs in Propositional calculus, Predicate calculus.	
Unit-4	**08 Hours**
Data Representation: Data Representation - Floating point Arithmetic – Addition, Subtraction, Multiplication and Division operation. Pitfall of floating point representation, Errors in numerical computation Iterative Methods, Measurement of Accuracy by using Absolute Error and Relative Error.	
Unit-5	**08 Hours**
Graphs & Trees: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Spanning Trees	
Text Books:	

1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, 7thEdition, 2017.
2. Seymour Lipschutz, Marc Laras Lipson, Varsha H. Patil, " Discrete Mathematics (Schaum's Outlines) (SIE)", Revised 3rd Edition, 2017
3. Murray Spiegel John Schiller, R. AluSrinivasan, DebasreeGoswami, " Probability and Statistics", 3rd Edition, 2017
4. Salaria, R.S.: "Computer Oriented Numerical Methods", Khanna Book Publishing Co. (P.) Ltd., New Delhi. 5th Edition, 2012

Reference Books:

1. A.Tamilarasi&A.M.Natarajan, "Theory of Automata and Formal Languages", New Age International Pvt. Ltd Publishers, 2008.
2. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.
3. Edgar Goodaire ,"Discrete Mathematics with Graph Theory" Pearson Education
4. Bernard Kolman. Robert Busby. Sharon C. Ross," Discrete Mathematical Structures (Classic Version), 6th Edition", Pearson Education

Object Oriented Programming with C++ [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-I			
Subject Code	**MCA-102**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
OOP Paradigm: Characteristics of OOP, Comparison between functional programming and OOP approach, characteristics of object oriented language - objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.	
Unit-2	**08 Hours**
Introduction to C++: Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, break control statements, Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors Inline member functions, static class member, friend functions, and dynamic memory allocation.	
Unit-3	**08 Hours**
Polymorphism and Inheritance: Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions. Single inheritance, types of inheritance, types of base classes, types of derivations, multiple inheritances, container classes, member access control.	
Unit-4	**08 Hours**
Exceptions and Templates: Exception Syntax, Multiple Exceptions, Function Templates, Function Templates with multiple argument templates.	
Unit-5	**08 Hours**
File Handling in C++: C++ Streams, Console Stream Classes, Formatted And Unformatted Console I/O Operations, manipulators, File Streams, Classes File Modes, File Pointers and Manipulations File I/O	

Text Books:

1. K.R. Venugopal, Raj Kumar Buyya, “Mastering C++", McGraw-Hill, 2017.
2. Rajaram R, Object Oriented Programming and C++”, 2nd Edition, New Age International, 2013.
3. E Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 2006
4. Yahwant Kanetkar, ”C++ Programming”, BPB Publication

Reference Books:

1. Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
2.Andrei Alexandrescu," Modern C++ Design: Generic Programming and Design Patterns Applied "
3. Robert Lafore," Object Oriented Programming in C++ ",4th Edition, 2002
4. Bjarne Stroustrup," C++ Programming Language", Addison-Wesley, 2013

Operating System
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-103**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**

Credits: 03

CONTENTS	**Teaching Hours**
Unit-1	**08 Hours**
Introduction: Definition and types of operating systems, Batch Systems, multi programming, timesharing, parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, system boot. Process Management : Process concept, Process scheduling, Cooperating process, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling and Algorithm evaluation.	
Unit-2	**08 Hours**
Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores , Classical problem of synchronization, Critical regions, Monitors, Deadlock-system model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling. **Storage Management**: Memory Management –Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing , Page Size and other considerations.	
Unit-3	**08 Hours**
Introduction to concept of Open Source Software: Introduction to Linux , Evolution of Linux, Linux vs. UNIX, Different Distributions of Linux, Installing Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting), Essential Linux Commands (Internal and External Commands), Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.	
Unit-4	**08 Hours**
Shell Programming: Shell Programming – Introduction to Shell, Various Shell of Linux, Shell Commands, I/O Redirection and Piping, Vi and Emacs editor, Shell control statements, Variables, if-then-else, case-switch, While, Until, Find, Shell Meta characters, Shell Scripts, Shell keywords, Tips and Traps, Built in Commands, Handling documents, C language programming, Prototyping, Coding, Compiling, Testing and Debugging, Filters	

Unit-5	**08 Hours**
Linux System Administrations: File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services)	

Text Books:

1. Silberschatz and Galvin, "Operating System Concepts", 10th edition, Wiley India, 2018.
2. Andrew S. Tanenbaum, Albert S. Woodhull, "Operating Systems Design & implementation", 3rd edition, Pearson Education, 2006.
3. UNIX: Concepts and Applications, Sumitabha Das, McGraw-Hill, 4th Edition, 2008.

Reference Books:

1. Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson, 2nd Edition, 2010.
2. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, Pearson, 5th Edition, 2010.
3. Forouzan B. A., Gilberg R. R., "UNIX and Shell Programming", TMH, 2nd edition, 2008.

Computer Architecture
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-104**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**

Credits: 03

CONTENTS	**Teaching Hours**
Unit-1	**08 Hours**
Basic Building Blocks: Gates, Boolean Functions and Expressions Designing Gate Networks, K-map simplification, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-flops, Registers and Counters, Sequential Circuits. **Arithmetic/Logic Unit**: Numbers Representation, Arithmetic Operations, Floating-Point Arithmetic.	
Unit-2	**08 Hours**
Register Transfer Language and Micro-operations: Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/ to memory. Design of Arithmetic & Logic Unit and Control Unit Control design hardwired control, micro programmed arithmetic and logical operations along with register transfer, timing in register.	
Unit-3	**08 Hours**
Instruction and Addressing: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple 1/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks.	
Unit-4	**08 Hours**
Memory System Design: Memory Origination, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache Memory, Virtual Memory. Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading.	
Unit-5	**08 Hours**
Vector and Array Processing: Shared-Memory, Multiprocessing, Distributed Mufti Computing. **Microprocessor Concepts**: Pin Diagram of 8085, Architecture of 8085, Addressing Mode of 8085, functional block diagram of 8085 assembly language, instruction set of 8085.	

Text Books:

1. M. Morris Mano "Computer System Architecture" Prentice Hall, 2017
2. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

Reference Books:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, 8th Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, 3rd Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach‖, Morgan Kaufmann / Elsevier Publishers, 5th Edition, 2012.

Database Systems [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-I			
Subject Code	**MCA-105**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	**Teaching Hours**
Unit-1	**06 Hours**
Introduction Overview of DBMS, Database System v/s File System, Architecture of DBMS, Data models**,** Entity Relationship Diagram, Types of Keys, Integrity Rules, Data Dictionary, Normalization (1NF, 2 NF, 3NF, BCNF, 4NF, 5NF), inclusion dependencies, loss less join decompositions, Codd's Rules	
Unit-2	**06 Hours**
Transaction Management Transactions: Concepts, ACID Properties, States Of Transaction, Serializaibility, Conflict & View Serializable Schedule, Checkpoints, Deadlock Handling	
Unit-3	**08 Hours**
Database Querying& Concurrency Control Relational Algebra, Set Operations, Relational Calculus, Steps In Query Processing, Algorithms For Selection, Sorting And Join Operations, Understanding Cost Issues In Queries, Query Optimization, Transformation Of Relational Expressions, Query Evaluation Plans Concurrency Control: Locks Based Protocols, Time Stamp Based Protocols, Validation Based Protocol, Multiple Granularity, Multi-version Schemes	
Unit-4	**08 Hours**
Recovery System & Security Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions, Shadow Paging, Failure with Loss of Non-Volatile Storage, Recovery From Catastrophic Failure, Introduction to Security & Authorization, Introduction to emerging Databases-OODBMS, ORDBMS, Distributed database, Multimedia database ,Special database-limitations of conventional databases, advantages of emerging databases.	
Unit-5	**12 Hours**
SQL and PL/SQL Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators, Tables, views and indexes, Constraints, Group By and Having Clause, Order By Clause, Queries and sub queries, Functions, PL/SQL basics, blocks, architecture, variables, constants, attributes, character set, PL/SQL control structure, data types, conditional and	

sequential control statements, cursors, exceptions, triggers, functions, procedures and packages.	

Text Books:

1. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th Edition, 2011
2. Korth, Silberschatz, Sudarshan, "Database Concepts", McGraw Hill, 6thEdition, 2010

Reference Books:

1. Thomas Connolly, Carolyan Begg,, "Database Systems,: A Practical Approach to Design, Implementation and Management, Addison Wesley, 2014
2. Simon AR, "Strategic Database Technology: Management for the year 2000", Morgan Kaufmann, 1995
3. Gray J and Reuter A, "Transaction Processing: Concepts and Techniques", Morgan Kaufmann, 1993.
4. S.K.Singh," Database System: Concept ,Design and Application" PEARSON,2006
5. Raghu Ramkrishnan, Johannes Gehrke , "Database Management Systems", McGraw Hill International, 2007
6. C.J.Date, Longman, "An Introduction to Database System", Pearson Education, 2003

Web Technologies
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-106**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**

Credits: 03

CONTENTS	**Teaching Hours**
Unit-1	**08 Hours**
Introduction to HTML The internet: history of the World Wide Web, hardware and software trend, object technology – java script object, scripting for the web-browser portability. Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HTML tables and formatting : basic HTML forms, more complex HTML forms, HTML5: Input Types & Attributes, internal linking, creating and using image maps	
Unit-2	**08 Hours**
Java Script Introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction – program Units in java script - function definitions, duration of identifiers, scope rules, recursion, java script global functions. Java script arrays: introduction, array-declaring and allocating arrays, references and reference parameters – passing arrays to functions, multiple subscripted arrays. Java script objects: introduction, math, string, date, Boolean and number objects.	
Unit-3	**08 Hours**
Dynamic HTML CSS: introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the CSS box model, user style sheets, Filter and Transitions, HTML DOM, Browser BOM Event model : introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event, more DHTML events.	
Unit-4	**08 Hours**
Introduction to PHP &Web Server Architecture Overview of PHP Capabilities, PHP HTML embedding tags & syntax, Simple script examples, PHP & HTTP Environment variables. PHP Language Core-Variables, Constants, Data Types, PHP: Operators, Flow Control & Loops, Arrays, String, Functions Include & require statements, Simple File & Directory Access Operations,	

Unit-5	**08 Hours**
Error handling, Processing HTML form using GET, POST, REQUEST, SESSION, COOKIE variables, Sending E-mail, Database Operations with PHP, Connecting to My-SQL (or any other database), Selecting a db, building & Sending Query, retrieving, updating & inserting data, CMS: Wordpress. Note: XAMMP is used for PHP	

Text Books:

1. Jennifer Robbins , "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web graphics",O'reilly, 2018
2. Adrian W. West ," Practical Web Design for Absolute Beginners", 2016
3. Harvey M. Dietel, Paul Dietel& Tem R. Nieto, ", Internet& World Wide Web How to Program", Pearson, 2011
4. Ivan Bayross. "Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI", BPB Publications, 2010

Reference Books:

1. Hofstetter, Fred, "Internet Technology at work", Osborne, 2004
2. Steven Holzner, "PHP: The Complete Reference", McGrawHill, 2008
3. Elizabeth Naramore, Jason Gerner, Jeremy Stolz, and Timothy Boronczyk Beginning PHP, Apache, MySql web development.Wrox Publication, 2009
4. Ivan Bayross, Sharanam Shah, Shroff ,"PHP 5.1 for Professionals", Publishers and Distributers Pvt. Ltd., 2007

Object Orientated Programming Lab
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-151**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 01			

Lab Experiments

1. Basic Commands of Linux.
2. Basic Shell Programming.
3. Accessing help options, File names and Wild Card, Types of Files, Directory Hierarchy, Operations.
4. Introduction of vi and gedit Editor, File Permissions and Simple Filter Commands
5. Control Statements:-Programs on if-else ladder, iterative statements, Functions and recursions, predefined functions.
6. Pointer and Dynamic Memory:-Programs on Arrays, sorting (Bubble, selection, insertion) Searching (linear, Binary), 2D Array (Matrix operations), Pointers, Structures, union, enum, Dynamic Memory allocation Programs on File Handling, Programs on Command Line Arguments.
7. Objects, Functions and Constructor:- Programs on classes and objects constructors, functions , inline functions, Friend function.
8. Polymorphism:-Programs on Function Overloading, overriding, Operator overloading, programs on different type of inheritances, virtual function.
9. Exception Handling and File Handling: - Programs on input/output Streams, Exception Handling, File Handling,and Template Classes.

SQL-PL/SQL Lab
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-I

Subject Code	**MCA-152**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 01			

Lab Experiments

1. SQL data types, Operators, Literals, Constraints
2. Assignment on Queries: Select / From / Where/ Group By/Having Clause/ Order By Clause/ SQL Operators/ Joins/ Built-in Functions
3. PL/SQL Block Structure
4. Conditional Statements
5. Iterations: Simple Loops, For Loop, While Loop, Nested Loops
6. Exception Handling
7. Database Programming with Record Variables
8. Database Programming with Cursors, Cursor-For Loop
9. Procedures & Functions
10. Triggers
11. Packages