OUTLINES OF TESTS,
SYLLABI AND COURSES OF READINGS

FOR

M.Sc. (IT)
(SEMESTER SYSTEM)

FIRST YEAR (Semester I & II)

(2016-17 & 2017-18 Sessions)

(As per RUSA Guidelines)
### SYLLABI, OUTLINES OF PAPERS AND TESTS

#### M.Sc. (IT) Semester I

2016-17 & 2017-2018 Sessions

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Title of Paper</th>
<th>Lectures per Week</th>
<th>Univ. Exam. Marks</th>
<th>Int. Ass. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-111</td>
<td>Introduction to Information Technology</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-112</td>
<td>Computer Programming using C</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-113</td>
<td>Computer Organization and Architecture</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-114</td>
<td>Mathematical Foundation of Computer Science</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-115</td>
<td>Operating Systems</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-116</td>
<td>Programming Lab-I</td>
<td>8</td>
<td>70</td>
<td>30</td>
</tr>
</tbody>
</table>

#### M.Sc. (IT) Semester II

2016-17 & 2017-2018 Sessions

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Title of Paper</th>
<th>Lectures per Week</th>
<th>Univ. Exam. Marks</th>
<th>Int. Ass. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-121</td>
<td>Object Oriented Programming Using C++</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-122</td>
<td>Data and File Structures</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-123</td>
<td>Visual Basic</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-124</td>
<td>RDBMS and Oracle</td>
<td>5</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-125</td>
<td>Programming Lab-II</td>
<td>8</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>MS-126</td>
<td>Programming Lab-III</td>
<td>8</td>
<td>70</td>
<td>30</td>
</tr>
</tbody>
</table>

#### CONTINUOUS ASSESSMENT (THEORY PAPERS)

1. Two tests will be conducted during the Semester. Both the tests will be considered for assessment.
   : 60% of the marks allotted for Continuous Assessment

2. Assignment/Quizzes
   : 20% of the marks allotted for Continuous Assessment

3. Attendance
   : 10% of the marks allotted for Continuous Assessment.

4. Class Participation and behaviour
   : 10% of the marks allotted for Continuous Assessment.
MS-111 : Introduction to Information Technology

Maximum Marks: 70     Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%    Lectures to be delivered: 45-55

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, classification of computers on the basis of capacity, purpose, and generation.
Number System: Decimal, hexadecimal, and octal systems, conversion from one system to the other.
Binary Arithmetic: Addition, subtraction and multiplication.

Memory types: Magnetic core, RAM, ROM, Secondary, Cache, Input and Output Units: functional characteristics; Overview of storage devices: floppy disk, hard disk, compact disk, tape; Printers: Impact, non-impact. Graphical I/O devices: Light pen, joystick, Mouse, Touch screen; OCR, OMR, MICR

SECTION B

Operating system: Functions of an operating system, Batch, multi-programming, time sharing, multi-processor, Multi-tasking.
Data Network and Communication: Network types, Transmission Modes, Network topologies, Internet: Evolution of Internet, E-mail WWW, FTP, TELNET, IRC, Video Conferencing.

Information Technology and Society : Applications of Information Technology in Railway, Airline, Banking, Insurance, Inventory Control, Hotel Management, Education, Mobile Phones, Information Kiosks, Weather Forecasting, Scientific Application,
E-Commerce: Meaning, its advantages & limitations, Types of E-Commerce.
Multimedia: Concepts, Components and Application, Entertainment Marketing.

Text Book:

Reference Books:
2. Satish Jain, “Information Technology”, BPB.
A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Problem Solving with Computers, c character set, identifier, constants, variables, rules for defining variables, Data types, operators: arithmetic, relational, logical, comma, conditional, assignment, arithmetic expressions, input and output statements, assignment statements.

Decision statement: if, if else, nested if, switch statement, break statement, continue statement, go to statement.
Loops and control statements: While loop, for loop and do-while loop, nested loops
Arrays: one dimensional Array, multi-dimensional arrays, array initialization.

SECTION B

Pointers: Pointer data type, pointers and arrays, pointers and functions.
Functions: definition, declaration, function prototype, types of functions, call by value, call by reference, recursion, processing character strings.

Structures: Using structures, arrays of structures and arrays in structures, union
Files in C: Sequential files, random access files, Unformatted files, Text files, binary files.

Text Book:

Reference Books:
1. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education
MS-113 : Computer Organization and Architecture

Maximum Marks: 70     Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%    Lectures to be delivered: 45-55

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
Concepts about bits, bytes and word, Number System: Number conversions, Arithmetic operations, Integer and floating point representation.
Character codes (ASCII, EBCDIC, BCD, 8421, Excess-3). Boolean expression - Minimization of Boolean expressions - Minterm - Maxterm - Sum of Products (SOP) - Product of Sums (POS) - Karnaugh map Minimization - Don't care conditions - Quine-McCluskey method of minimization.

Basic Gates, Combinational logic design: half-adder, full-adder, half-subtractor, full-subtractor, binary parallel adder, Multiplexer/ Demultiplexer, decoder, encoder.
Sequential circuits: concept, flip-flops (D, RS, JK, JK-Master-Slave, T), counters (Ripple, Asynchronous, Synchronous, Decade, Mod-5), Instruction codes, Instruction formats, Instruction cycle, Addressing modes.

SECTION B
Register Transfer Language, Arithmetic, Logic and Shift micro-operations, Arithmetic Logic Shift unit.
Control Memory: Design of control unit, Microprogrammed and Hardwired control unit (overview only), Features of RISC and CISC.

Memory organization: Concepts of semiconductor memory, CPU- memory interaction, organization of memory modules, Cache memory and related mapping and replacement policies, Virtual memory.
I/O organization: I/O interface, Modes of data transfer: Programmed I/O, Interrupt initiated I/O, DMA.

Text Book:

Reference Books:
A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A


SECTION B
Recurrence Relations, solving recurrence relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions for sorting recurrence relations, Inclusion-Exclusion.
Relations and their properties, n-any relations and their applications, representing relations, closure of relation, equivalence relations, partial ordering.

Graphs: Introduction, terminology, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths, Shortest Path Problems, Planar Graphs.

Text Book:

References Books:
1. Discrete and Combinational Mathematics, Ralph P. Grimaldi, Pearson Education.
2. Elements of Discrete Mathematics, C. L. Luie, TMH Publications.
5. Discrete Mathematical Structures, B. Kotman, R.C. Busbay, S. Ross, PHI.
A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

Introduction to Operating System: Definition, Types of Operating system, Operating system components, Operating system services.
Process Management: Process concept, Process cs. threads, CPU scheduling criteria, Scheduling algorithms, and Algorithm evaluation
Deadlocks: Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, avoidance, detection and recovery.

SECTION B

Memory Management: Background, logical vs. physical address space, Contiguous memory management schemes using Multi partition memory allocation using fixed number of tasks and variable number of tasks, paging and segmentation.
Virtual Memory management: Concept, demand paging and demand segmentation.
Mass storage structure: Disk structure, disk scheduling algorithms.
Protection: Goals of protection, Access matrix.

Text Book:

Reference Books:
4. Hansen, Per Brich, "The Architecture of Concurrent Programs", PHI.
5. Shaw, "Logical Design of Operating System", PHI.
MS-116 : Programming Lab-I

Maximum Marks: 100*  Max. Time: 3 Hrs.
Minimum Pass Marks: 35%  Practical sessions to be conducted: 60-70

This laboratory course will mainly comprise of exercises based on subject MS-112: Computer Programming Using C.

*Maximum Marks for Continuous Assessment: 30
Maximum Marks for University Examination: 70
A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
Introduction to C++: Identifier, Keywords, Constants. Operators: Arithmetic, relational, logical, conditional and assignment. Size of operator, Operator precedence and associativity. Type conversion, Variable declaration, expressions, statements, manipulators. Input and output statements, stream I/O, Conditional and Iterative statements, breaking control statements. Storage Classes, Arrays, Arrays as Character Strings, Structures, Unions, Bit fields, Enumerations and User defined types.
Pointers: Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions. Functions: Prototyping, Definition and Call, Scope Rules. Parameter Passing by value, by address and by reference, Functions returning references, Const functions, recursion, function overloading, Default Arguments, Const arguments, Pre-processor, Type casting.

SECTION B
Classes and Objects: Class Declaration and Class Definition, Defining member functions, making functions inline, Nesting of member functions, Members access control. THIS pointer. Objects: Object as function arguments, array of objects, functions returning objects, Const member. Static data members and Static member functions, Friend functions and Friend classes.
Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class, Types of inheritance, Types of base classes, Code Reusability. Polymorphism: Methods of achieving polymorphic behavior.
Templates: Generic Functions and Generic Classes, Overloading of template functions. Exception Handling catching class types, handling derived class exceptions, catching exceptions, restricting exception.

Text Book:

Reference Books:
1. Deitel and Deitel, “C++ How to Program”, Pearson Education.
A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
Data Structure: Introduction to data structure and algorithm, Algorithm analysis: Time space trade off algorithms and Big O notation Arrays: Introduction, one dimensional and multidimensional arrays, memory representation of arrays, operations on arrays, sparse arrays and sparse matrices and their implementation, Advantages and limitation of arrays.
Stacks: Introduction; Operation on stacks; Implementation of stacks Application of stacks: matching parenthesis, evaluation of arithmetic expressions, conversion from infix to postfix, recursion.
Queues: Introduction, operation on queues, circular queue, memory representation of queues, dequeues, priority queues, application of queues.
Linked List: Introduction; operation on linked list, circular linked list, doubly linked list, header linked list, implementation of linked list, application of linked lists.
Trees: Introduction; Binary Tree; Threaded Binary Trees; Binary Search Tree; Balanced Trees; B-Trees; Heap

SECTION B
Graphs: Introduction Graph: Graph terminology, Memory Representation of Graphs: adjacency matrix representation of graphs, adjacency list or linked representation of graphs, Operations performed on graphs, Application of graphs
Sorting: Selection Sort, Insertion Sort, Merge Sort, Bucket Sort, Radix Sort, Quick Sort and Heap Sort
Hashing: Hashing techniques; Collision resolution; Deleting items from a hash table; Application of hashing
File Organization: Introduction, External Storage Device: Sequential Access Storage Device (SASD), Direct Access Storage Device (DASD) Sequential File Organization: processing sequential files, operations on sequential files, advantages and disadvantages of sequential file organization Direct File Organization: introduction, processing of direct files, advantages and disadvantages of direct organization Indexed Sequential Organization: introduction, processing of indexed sequential files, advantages and disadvantages of indexed sequential organization

Text Book:

Reference Books:
1. Loomis, Marry, “Data Management and File Structures”, PHI
MS-123 : Visual Basic

Maximum Marks: 70     Maximum Time: 3 Hrs.
Minimum Pass Marks: 35%     Lectures to be delivered: 45-55

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A
Introduction to Visual Basic: Creating User Interfaces with Windows Common Controls, Creating Menus for Programs, Advance Design Features, Working with Collections, Creating Classes in a Program, Working with Active Data Objects.

Working with forms, drawing with VB, Multiple document interface, basic Active X controls, advanced active X controls.

Extending the Capabilities of Visual Basic: - Declaring and using External Functions, Creating ActiveX Control with Visual Basic

Communicating with Other Programs: Using ActiveX Server, Creating ActiveX Client Applications.

SECTION B
Integrating Visual Basic with the Internet: - Writing Internet Application with Visual Basic, Web Browsing objects, using document object, Active Server Pages, using web browser controls, using history objects.

Creating Database Applications: - Accessing Data with Data Control
Using visual data manager, validating data, selected data with SQL, advanced data bound controls, active data objects, ADO data objects.

Text Book:

Reference Books:
1. Mastering Visual basic 6.0 by BPB Publications
4. Mastering Database Programming with Visual Basic 6 by Petroutsos
MS-124 : RDBMS and Oracle

Maximum Marks: 70
Minimum Pass Marks: 35%

A) INSTRUCTIONS FOR THE PAPER SETTER
The question paper will consist of three Sections: A, B and C. Sections A and B will have four questions each from the respective section of the syllabus and will carry 10.5 marks for each question. Section C will consist of 7-15 short answer type questions covering the entire syllabus uniformly and will carry a total of 28 marks.

B) INSTRUCTIONS FOR THE CANDIDATES
1. Candidates are required to attempt five questions in all, selecting two questions each from Section A and Section B and compulsory question of Section C.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

SECTION B

Text Book:

Reference Books:
5. C.J. Date, "An Introduction to Database Systems”, Pearson Education.
7. Bobrowski, “Client Server Architecture and Introduction to Oracle 7”.

Maximum Time: 3 Hrs.
Lectures to be delivered: 45-55
MS-125 : Programming Lab-II

Maximum Marks: 100*  
Minimum Pass Marks: 35%

Max. Time: 3 Hrs.  
Practical sessions to be conducted: 60-70

This laboratory course will mainly comprise of exercise based on subject MS-121: Object Oriented Programming Using C++ and MS-122: Data & File Structures.

*Maximum Marks for Continuous Assessment: 30
Maximum Marks for University Examination: 70
MS-126  Programming Lab-III

Maximum Marks: 100*        Max. Time: 3 Hrs.
Minimum Pass Marks: 35%        Practical sessions to be conducted: 60-70

This laboratory course will mainly comprise of exercise based on subjects MS-123: Visual Basic and MS-124: RDBMS & Oracle.

*Maximum Marks for Continuous Assessment: 30
  Maximum Marks for University Examination: 70