DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI

UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc. IT

CBCS CURRICULUM OF

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY (M.Sc.IT)

SUBJECT CODE = M.Sc. IT

Guideline and Syllabus for 2 years M.Sc. Programme in IT

2018-2020 onwards

APPROVED BY

THE BOARD OF STUDIES,

UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc. IT

DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI

UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc.IT

BOARD OF STUDIES

FOREWORD

A Meeting of the BOARD OF STUDIES was held in the UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc.IT, DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI on 25.05.2019. All members participated in the syllabus approval meeting. The Draft Syllabus for M.Sc. Programme in Information Technology was approved. It will be placed before the ACADEMIC COUNCIL of DSPM UNIVERSITY for final approval.

1. **Internal Members:**

Dr. Ashoke Kumar Mahato
Co-ordinator
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

Dr. Indra Nath Sahu
Assistant Professor
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

Mr. Asit Kumar Mohapatra
Assistant Professor
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

2. **External Expert Members:**

Dr. S. N. Singh
Professor
Department of Information Technology
XISS, Ranchi

Ms. Gaytri Kumari Gupta
Assistant Professor
Department of Information Technology
Jamshedpur Women's College, Jamshedpur

FOREWORD

In the UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc.IT, DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, the faculty members participated in the syllabus preparation meeting held on 15.05.2019, 17.05.2019, 18.05.2019 and 20.05.2019 Keeping in view the aims of the UGC Model Curriculum in developing interdisciplinary skills in students, linking computer studies with professional development of students and also industrial training, the teachers of different branches of computer, namely Computer Architecture, Operating System, DBMS and Programming Languages had joint brainstorming sessions and arrived at a Draft Syllabus in IT for four semesters M.Sc. course. The Draft Syllabus was then approved by the Department Council in a meeting held on 22.05.2019 and placed before the Board of Studies of UNIVERSITY DEPARTMENT OF MATHEMATICS & M.Sc.IT, DSPM University, and Ranchi for approval.

1. **Internal Members:**

Dr. Ashoke Kumar Mahato — **Co-ordinator**
Co-ordinator
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

Dr. Indra Nath Sahu — **Faculty Member**
Assistant Professor
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

Mr. Asit Kumar Mohapatra — **Faculty Member**
Assistant Professor
University Department of Mathematics & M.Sc.IT
Dr. Shyama Prasad Mukherjee University, Ranchi

GENERAL GUIDELINES

1. M.Sc. Course in IT shall be of two years duration.
2. There shall be semester wise examination.
3. There shall be four semester (04) in two years, Semester-I and Semester-II in first year (1st year) and Semester-III and Semester-IV in the second year (2nd year).
4. There shall be three theory papers of 100 marks each of THREE HOURS duration and one practical exam of 100 marks of THREE HOUR duration in each Semester-I, II & III. In Semester-IV, there will be three theory papers of 100 marks each of THREE HOURS duration and one PROJECT WORK OF 100 MARKS. There shall be a Mid Term Examination also in each Semester of 30 marks in each theory papers.
5. There shall be 12 theory papers, 3 practical papers and 1 Project Work altogether.
6. There shall be TWO GROUPS elective paper, out of which student has to elect ONE GROUP.

GROUP OF ELECTIVE PAPERS:

Language Elective-I

A. C++ Programming
B. Java Programming

Elective-2:

A. Distributed Database
B. Artificial Intelligence
C. Machine Learning
D. Optimization Techniques System

Elective-3:

A. Automata Theory
B. Cloud Computing
C. Data Warehousing and Data Mining
D. Internet of Things

7. Each theory paper in each END SEMESTER EXAMINATION shall carry SEVENTY (70) as FULL MARKS.
8. There shall be MID SEMESTER EXAMINATION / INTERNAL EVALUATION in the middle of each Semester carrying THIRYT (30) as FULL MARKS.
9. There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
10. The duration of End-Semester Examination shall be of THREE (03) HOURS in each theory paper of each Semester.

CONTENTS

Course Structure for M.Sc. Programme in IT

SEM	COURSE OPTED	PAPER	DISTRIBUTION OF MARKS			
			MID SEM	END SEM	PRACTICAL / PROJECT	TOTAL
I	FC (Compulsory) – (FCMIT 101)	1	30	70	--	100
	Core Course – 1 (CCMIT 102)	2	30	70	--	100
	Core Course – 2 (CCMIT 103)	3	30	70	--	100
	Core Course (P) – 3 (CPMIT 104)	4	--	--	100	100
II	Elective Course – 1 (ECMIT 201)	5	30	70	--	100
	Core Course – 4 (CCMIT 202)	6	30	70	--	100
	Core Course – 5 (CCMIT 203)	7	30	70	--	100
	Elective Course (P) – 2 (EPMIT 204)	8	--	--	100	100
III	Core Course – 6 (CCMIT 301)	9	30	70	--	100
	Core Course – 7 (CCMIT 302)	10	30	70	--	100
	Elective Course – 3 (ECMIT 303)	11	30	70	--	100
	Core Course (P) – 8 (CPMIT 304)	12	--	--	100	100
IV	Core Course – 9 (CCMIT 401)	13	30	70	--	100
	Elective Course – 4 (ECMIT 402)	14	30	70	--	100
	Core Course (P) – 10 (CPMIT 403)	15	--	--	100	100
	Core Course Project (P) -11(CPMIT 404)	16	--	--	100	100

Semester-wise Distribution of Course

SEM	COURSE	PAPER	CREDIT	Hrs./Week
I	FC (Compulsory) – (FCMIT 101)	Introduction to Information Technology	5	5 (L) + 1 (T)
	Core Course – 1 (CCMIT 102)	Database Management System	5	5 (L) + 1 (T)
	Core Course – 2 (CCMIT 103)	Data Structure Through C	5	5 (L) + 1 (T)
	Core Course (P) – 3 (CCMIT 104)	Lab. on Data Structure through C	5	10
II	Elective Course – 1 (ECMIT 201)	**Language Elective-I** A. C++ Programming OR B. Java Programming	5	5 (L) + 1 (T)
	Core Course – 4 (CCMIT 202)	Software Engineering	5	5 (L) + 1 (T)
	Core Course – 5 (CCMIT 203)	Operating System	5	5 (L) + 1 (T)
	Elective Course (P) – 2 (EPMIT 204)	**Language Elective-I Lab on** A. C++ Programming OR B. Java Programming	5	10
III	Core Course – 6 (CCMIT 301)	Computer Communication & Network	5	5 (L) + 1 (T)
	Core Course – 7 (CCMIT 302)	Advance Java Programming	5	5 (L) + 1 (T)
	Elective Course – 2 (ECMIT 303)	**Elective I** 1. Distributed Database 2. Artificial Intelligence 3. Machine Learning 4. Optimization Techniques System	5	5 (L) + 1 (T)
	Core Course (P) – 8 (CPMIT 304)	Lab. on Advance Java Programming	5	10
IV	Core Course – 9 (CCMIT 401)	Python Programming	5	5 (L) + 1 (T)
	Elective Course – 3 (ECMIT 402)	**Elective II** 1. Automata Theory 2. Cloud Computing 3. Data Warehousing and Data Mining 4. Internet of Things	5	5 (L) + 1 (T)
	Core Course (P) – 10 (CPMIT 403)	Lab on Python Programming	5	5 (L) + 1 (T)
	Core Course Project (P) -11(CPMIT 404)	Project - Dissertation	5	10

Detailed Syllabus

SEMESTER I **4 Papers**

Total 100 x 4 = 400 Marks

I. COMPULSORY FOUNDATION COURSE (FC) [FCMIT 101]:

(Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):
There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

INTRODUCTION TO INFORMATION TECHNOLOGY

Theory: 45 Lectures; Tutorial: 15 Hours

Unit-I Introduction TO Computers: Introduction, Characteristics of Computers Evolution of Computers Generations of Computers, Classification of Computers, Application of Computers.
Number Systems And Logic Gates: Introduction, Number Systems, Conversion between Number Bases, Arithmetic System, Signed and Unsigned Numbers, Binary Coding, Logic Gates, Boolean algebra, Combination of Logic Gates.

Unit- II Computer Architecture: Introduction, Central Processing Unit, Memory, Communication between Various Units of a Computer System, Processor Speed, Multiprocessor Systems. Primary Memory: Introduction, Memory Hierarchy, Random Access Memory (RAM), Types Of RAM, Read Only Memory (ROM), Types Of ROM.

Unit- III Secondary Memory: Introduction, C1assification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk.
Input Devices: Introduction, Keyboard, Pointing Devices, Scanners, Optical Scanners.
Output Devices: Introduction, Classification of Output, Hard Copy Output Devices, Printers, Soft Copy Output Devices, Monitors.

Unit- IV Computer Languages: Introduction, Evolution of Programming Languages, Classification Of Programming Languages, Generations of Programming Languages, Features Of a Good Programming Language, Selection Of a Programming Language. Computer Software: Introduction, Software: Definition, Relationship Between Software
And Hardware, Software Categories, Application Software, Software Terminology.

Unit- V Operating System: Introduction, Operating System, Evolution Of Operating System, Types of Operating System, Functions Of an Operating System, Modern Operating Systems.

Unit- VI Data Communication And Computer Network: Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network Devices.

Unit-VII Internet Basics: Introduction, Evolution of Internet, Basic Internet Terms, Internet Applications, Electronic Mail- An Introduction, How E-mail Works.

Text book:

1. Introduction to Computer Science- ITL Education Solutions Limited, Pearson education, 2004.

Reference Book:

1. N. Nilsan & S. Schochen -The Elements Of Computing Systems, PHI, New Delhi

II. CORE COURSE – C1 [CCMIT 102]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

DATABASE MANAGEMENT SYSTEM

Theory: 45 Lectures; Tutorial: 15 Hours

Unit- I Database System Concept & Architecture: Purpose of Database Systems, Data Models, Schemas and Instances, Three—Schema Architecture and Data Independence, Database languages, Database Architecture, Classification of DBMS, relational database, Database users and Administrators, Advantages of 'DBMS.

Unit- II Data Modeling: Entities and Entity Sets, Relationships and Relationship Sets, Keys, Mapping, Constraints, ER Diagram, Reducing ER Diagram to tables, Generalization and Spec1alization, Aggregation. Conceptual object modeling using UML class diagrams knowledge representation concepts.

Unit— III Relational Model and ER, EER to Relational Mapping: Concepts, Constraints and Relational database Schemas, Relational Algebra, Relational Calculus, QUEL, QBE,SQL. Mapping EER Model concepts to relation

Unit- IV Database Design: Pitfalls in relational database design, Normalization using functional, Multivalued and join dependencies, DKNF, Atomic values, alternative approaches to database design. Functional Dependencies, Irreducible Sets of Dependencies, Nonloss decomposition, 1st, 2nd & 3rd NF, Dependency Preservation, Boyce Codd NF, Multivalued Dependency & 4th NF, Join Dependency & 5 NF, Domain Key Normal Form, Restriction-Union Normal Form, Demoralization.

Unit- V Security & Integrity: Security & Integrity violations, authorization and views, integrity constants, encryption, Statistical databases.

Unit- VI Transaction Processing, Concurrency Control: Transaction Processing, Schedules and Recovery, Locking and Timestamp Ordering for concurrency control.

Unit- VII Database Recovery Techniques: Recovery concepts, recovery Techniques based on deferred update, recovery techniques based on immediate update, shadow paging, the ARIES recovery algorithm, recovery in multi database systems, database backup and recovery from catastrophic failures.

Text Book:
1. Fundamentals of Database Systems "Ramez Elmasri", Pearson Education
Reference Book:
1. Database Systems Concepts “A Silbers~3hatz,Korth", McGraw Hill.

III. CORE COURSE – C2 [CCMIT 103]: (Credits: Practical -04)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

DATA STRUCTURE THROUGH C

Theory: 45 Lectures; Tutorial: 15 Hours

Unit— I Introduction: Introduction to Data Structures: Data Types, Abstract Data Types, Array, Arrays an abstract data type, Arrays row major and column major representation, Algorithm concepts.

Unit— II Linked List: Linear List Concepts, Linked List Concepts, Singly Linked List, Doubly Linked List, Circular Linked List, Linked List Algorithms, Processing a Linked List, Linked List Implementation

Unit- III Stacks: **Stacks:** Basic concepts of Stack, Stack Operations, Stack Array Implementation, Stack dynamic Implementation. Stack Linked List Implementation, Stack Applications (Expression evaluation, Conversion from infix to prefix and postfix).

Queue: Basic concepts of Queue, Queue Operations, Ordinary Queue, Double-Ended Queue, Circular Queue, Priority Queue, Queue Array Implementation, Queue Linked List Design.

Recursion: Factorial A case study, how recursion works, Design recursive algorithms, Another case study-Fibonacci Numbers, The towers of Hanoi.

Unit- IV Introduction to Tree: Basic Tree concepts, Binary trees, Binary tree traversal, Expression tree, general trees.

Search Trees: Binary search trees, AVL Trees, AVL Tree Rotations techniques, AVL Tree Operations.

Unit- V Graphs: Basic Graph Concepts, Graph Representations (Adjacency matrix, Incident matrix & adjacency lists), Graph Traversals (BFS and DFS).

Unit- VI Heaps: Heap Definition, Heap structure, Basic Heap algorithms, Heap data structure, Heap Algorithms, Heap Applications

Multiway Tree: m-way search tree, B Tree, Simplified B tree, B Tree variations,

Unit- VII Advanced sorting concepts: General sort concepts, Insertion sorts, selection sorts, exchange sorts, external sorts.
Searching: Linear Search and Binary Search

Text Book:

1. R F Gilberg and B A Forouzan, Data structures: A pseudocode Approach with C++, Thomson Brooks/Cole.

Reference Book:

1. Horowitz, Sahani, Fundamentals of Data structure, CBS, New Delhi. Connenet 211. Introduction to Algorithms, PHI.
2. Horowitz et.al-Fundamentals of Data Structures in C++, Galgotia Publication, New Delhi
3. M. Berman- Data Structures vie C++, Oxford Univ. Press, Inc. Indian Reprint
4. M. T. Goodrich et.al- Data Structures and Algorithms in C++, John Wiley, Inc. Indian Reprint

IV. CORE COURSE(P) – C3 [CPMIT 104]: (Credits: Practical -05)

Marks: 100

End Semester Practical Examination (ESE Pr):

Lab: There will be **four** questions in Practical Examination of 3Hrs. out of which **any two** are to be answered. Students have to answer the given questions on answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 100 marks and will be so framed that the students are able to answer them within the stipulated time.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

DATA STRUCTURE THROUGH C LAB **Practical: 60 Hours**

Students are expected to do programming for followings:

1. Array Implementation:
   - Insertions and Deletions elements in existing array.
   - Transpose of a Matrix.
   - Summation of left diagonal and right diagonal of a square matrix.
   - Maximum and Minimum value from a matrix.
   - Multiplications of two Matrixes.
   - Summation of two Matrixes.
2. Stack Implementation:
   - Static Implementations of Stack.
   - Dynamic Implementation of Stack.
   - Linked List Implementation of Stack.
3. Queue Implementation(Ordinary, DEQUE & Circular)
   - Static Implementations of Queue.
   - Dynamic Implementation of Queue.
   - Linked List Implementation of Queue.
4. Link List Implementation (Singly, Doubly, Circularly)
5. Various Trees Implementation.
6. Sorting Implementation
   - Bubble sort, Insertion sort, Selection Sort, Exchange sort, Merge Sort, Quick sort.
7. Searching implementation
   - Linear search and Binary Search

Reference Books:

- S.K. Srivastava, Deepali Srivastava- Data Structure through C, BPB Publication.

SEMESTER II **4 Papers**

Total 100 x 4 = 400 Marks

I. ELECTIVE COURSE – EC1 [ECMIT 201]:

(Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

A. C++ PROGRAMMING

Unit- I ELEMENTARY C++ PROGRAMMING

Getting Started, Some Simple Programs, The Output Operator, Characters and Literals Variables and their Declarations, Program Tokens, Initializing Variables, Objects Variables, and Constants, The Input Operator,

FUNDAMENTAL TYPES

Numeric Data Types, The Boolean Type, Enumeration Types, Character Types, Integer Types Arithmetic Operators, The Increment and Decrement Operator, Composite Assignment Operator, Floating —Point Types, Type Conversions, Numeric Overflow, Round- Off Error The E- format for floating— Point Values,

Unit- II SELECTION

The if Statement The if Else Statement, Keyword, Comparison Operator's, Statement Blocks, Compound Condition, Short-Circuiting, Boolean Expressions, Nested Selection Statement The Else if Construct, The Switch Statement, The Conditional Expression Operator.

ITERATION

The while Statement, Terminating a Loop, the Do while Statement, the For Statement the Break Statement, The continue Statement, The Go to Statement, Generating Pseudo-Random Numbers.

Unit- III FUNCTIONS

Introduction, Standard C++ Library Functions, User- Defined Functions, Test Drivers
Function Declaration and Definition, Local Variables and Functions, Void Functions I/O
Functions, Passing by Reference, Passing by Reference, Inline Functions, Scope Overloading, The Main () Function, Default Arguments,

ARRAYS Introduction

Processing Arrays, Initializing an Array, Array Index Out of Bounds Passing an Array to a Function, The Linear Search Algorithm, The Bubble Sort Algorithm, The Binary Search Algorithm, Using Arrays with Enumeration Types, Type Definition, Multidimensional Arrays

Unit— IV POINTERS AND REFERENCES

The Reference Operator, References, Pointers, The Deference Operator, Derived types Objects and L

values, Returning a Reference, Arrays and Pointers, Using const with Pointers Arrays of Pointer and pointers to Arrays, Pointers to Pointer, Pointers to Functions, Nul nul and void.

C-STRINGS

Introduction, Review of Pointer, C-Strings, Some Cin Member Function, Standard C Character Functions, Arrays of strings, Standard C String Functions, STANDARD C++ STRINGS Introduction, Formatted Input, Unformatted Input, The Standard C++ string type, Files String Streams

Unit— V CLASSES

Introduction Class Declarations, Constructors, Constructor Initialization Lists Access functions, Private Member Functions, The Copy Constructor, The Class Destructor Constant Objects, Structures, Pointers to Objects, Static Data Members, Static Function Members.

Unit— V1 OVERLOADING OPERATORS

Introduction Overloading the Assignment Operator, The this Pointer, Overloading Arithmetic Operators, Overloading the Arithmetic Assignment Operators, Overloading the Relational Operators, Overloading the Stream Operators, Conversion Operators, Overloading the Increment and Decrement Operators, Overloading the Subscript Operator.

Unit- VII COMPOSITION AND INHERITAN CE

Introduction Composition, Inheritance, Protected Class Members, Overriding and Dominating Inherited Members, Private Access versus Protected Access, Virtual Functions And Polymorphism, Virtual Destructors, Abstract Base Classes, Object-Oriented Programming

TEMPLATED AND ITERATORS

Introduction Function Templates, Class Templates, Container Classes, Subclass Templates, Passing Template Classes to Template Parameters, A Class Template for Linked Lists, iterator classes

TEXT BOOK:

1. Programming with C++ John R Hubbard Second Edition TMH

REFERENCE BOOKS:

1. Object oriented programming with c++ E. Balagruswamy 3rd ediition TMH
2. C++ how to programming p. g. Deitel & Deitel 6th Ediition
3. C++ The complete Reference, Scheldt, 4th Ed, TMH.

OR

B. ELECTIVE COURSE - I [ECMIT 201]:

(Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

JAVA PROGRAMMING

Theory: 45 Lectures; Tutorial: 15 Hours

Unit I Fundamentals of Java programming: Introduction to Object Oriented Programming Language, Difference with C and C++, Benefits and Applications of OOP. Introduction to Java, Basic features of Java, Java Program Structure, JDK Tools, Java standard Library (JSL), Java Virtual Machine (Byte codes),

Unit II Java Tokens, Variables, Scope of Variables, Keywords, Identifiers, Punctuation Symbols, Unicode Characters, Data Types, Operators, Decision Making and Looping (if, if else, Nested if, if else-if else ladder, switch case, for, while, do while, break, & continue).

Class, Object, Constructors, Method Overloading, Inheritance, Overriding Methods, This and Super, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control

Unit III Class and Object: Declaring a Class, Creating an Object, Methods, Exploring new Operator, constructor its types, final, this Keyword, Recursion, Access Specifiers, Inheritance its types, super Keyword, Polymorphism, Overriding Methods, Runtime Polymorphism, Implementing Abstract classes, packages and interfaces.

Unit IV String: Concatenation and Changing Case, Sub strings Data Conversion String Buffer, Types of Array, Array of Objects, Wrapper Class, Vector Class.

Unit V Exception Handling and Threads: Errors, Types of Errors, Exceptions, Exception handling code (Try, Catch and finally), Throwing our own Exception. Introduction to Threads, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread and Thread Priority

Unit VI File input and Output: File Class, Byte Stream Classes Reading from and Writing to a File, Character Stream Classes, Random Access File, Sequence Input Stream, Binary files.

Data Base Connectivity: ODBC API, JDBC Application Architecture, Java. SQL, obtaining a connection, step connecting Object, Working with Result, statement, Set Meta Data Interface.

Unit VII Graphical User Interfaces: Creating User Interfaces, Overview of a Java GUI, Developing a Java GUI, Adding Functionality to a GUI, Improving GUI Layout.

Reference Books:

- "An Introduction to Java Programming and Object Oriented Application Development" –Richard A. Jhonson.
- Detail-Java How to Program, Pearson Education, New Delhi.
- E. Balagurusamy-Java Programming, TMH, New Delhi, 2005.
- James M. Sleek- Programming and Problem Solving with Java, Thomson Learning, Indian Edition, . Herbert Schildt- The Complete Reference, TMH

II. CORE COURSE –C4 [CCMIT 202]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

SOFTWARE ENGINEERING

Theory: 45 Lectures; Tutorial: 15 Hours

Unit-I

Introduction to software engineering: Evolving Role of Software, Changing Nature of Software, Legacy software, Software Engineering —A Layered Technology.

Unit-II

Process Frame Work, process Pattern , Process Model, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models , Unified process Model, Agile Process Model.

Unit- III

Requirement Engineering: A bridge to design and construction, Requirement Engineering Task, Initiating the Requirement Engineering Process, Eliciting Requirements, Developing Use Case, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Unit-IV

Design Engineering: Design process and Design Quality, Design concepts, Design Models, Pattern Based software Design .

Unit- V

Tasting Strategies and Testing Tactics: Strategic Approach to software Testing , Test strategies for conventional and Object oriented software , Validation Testing , system testing , White Box testing , Basic Path testing — control structure Testing, Black box testing, Object Oriented Testing Methods .

Unit-VI

Metric for process and Estimation Techniques: Process metrics, Software Measurement, Software Project Estimation, Decomposition Techniques , Empirical Estimation Models, estimation for object oriented projects — Specialized Estimation Techniques.

Unit-VII

Software Quality and Configuration Management: quality concepts , Software Quality Assurance , software Reliability , software configuration Management , SCM Repository , SCM Process .

Text Book:

1. Roger S Pressman — "Software Engineering -A Practitioner"s Approach"6,,h Edn., McGraw Hill .

Reference Book:

1. Ian Sommerville — "Software Engineering " 7th Edn, Pearson Education

III. CORE COURSE – C5 [CCMIT 203]: (Credits: Theory-04)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100 Pass Marks: 45

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

OPERATING SYSTEM

Theory: 45 Lectures; Tutorial: 15 Hours

Unit- I

Overview of Operating System: OS and the computer system, efficiency, system performance and user convenience, classes of 08‟s, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time OS, Distributed OS‟s, Modern OS‟s.

Unit- II

Process and Threads: Process and Programs, Programming View of Process, OS View of Process, Threads, Case studies of Process and Threads.

Unit- III

Scheduling: Preliminaries, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, Scheduling in Practice, Real Time Scheduling, Scheduling in UNIX, Scheduling in LINUX, Scheduling in Windows, Performance Analysis of Scheduling Policies

Unit— IV

Memory Management: Managing the Memory, Hierarchy, Static and Dynamic Memory Allocation, Memory allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Non contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A review of Relocation, Linking and Program.

Unit—V

Virtual Memory: Virtual Memory Basics, Demand Paging, Page Replacement Policies, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Unix Virtual Memory, Linux Virtual Memory, Virtual Memory using Segmentation.

Unit— VI

Deadlocks: Definition of Deadlocks, Deadlocks 1n Resources Allocation, Handling Deadlocks, Deadlocks and Resolution, Deadlocks Prevention, Deadlock avoidance.

Unit- VII

Security and Protection: Overview of Security and Protection, Goals of Security and Protection, Security Attacks, Formal and Practical aspects of Security, Encryption, Authentication and Password Securities, Access Description and the Access Control Matrix, Protection Structures, Capabilities, Unix security, Linux Security, Security.

Text book:

1. D.M. Dhamdhere- Operating Systems: A Concept Based Approach, 2nd edition, TMH, New Delhi- 2006

Reference Books:

1.A.Silberschatz et. al— Operating System Concepts 6th edition, John Wiley, Indian Reprint, 2003.

3. H. M. Deitel- Operating Systems, 2nd edition Pearson Education 2003.

2. Charles Crowley- Operating Systems- A Design Oriented Approach, TMH

3. AS. Tanenbaun- Operating System: Design and Implementation, PHI, New Delhi, 2002

IV. LANGUAGE ELECTIVE-2 LAB [EPMIT 204]: (Credits: Practical -05)

Marks: 100

End Semester Practical Examination (ESE Pr):

Lab: There will be **four** questions in Practical Examination of 3Hrs. out of which **any two** are to be answered. Students have to answer the given questions on answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 100 marks and will be so framed that the students are able to answer them within the stipulated time.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

A. LAB ON C++ PROGRAMMING **Practical: 60 Hours**

1.	WAPC++ to display formatted I/O using manipulators like: setw(), setprecision(), setfill()
2.	WAPC++ to display formatted I/O using ios member functions like: width(), precision(), fill()
3.	WAPC++ to design a class Student having member variables as Student_Roll Student_Name Declare them in the public section and initialize them using object of the class Student a. Compile time initialization b. Run time initialization
4.	WAPC++ to design a class Student having members as Variables: Student_Roll Student_Name Methods: void Input() void Display() Declare member variables in private section and member methods in public section. Read and Write values to and from the member variable using object of class Student.
5.	WAPC++ to initialize the member variables declared in assignment question 2 using default constructor.
6.	WAPC++ to initialize the member variables declared in assignment question 2 using parameterized constructer.
7.	WAPC++ to initialize the member variables declared in assignment question 2 using parameterized constructer and constructor overloading.
8.	WAPC++ to overload the unary operator ++.
9.	WAPC++ to overload the unary operator--.
10.	WAPC++ to overload the unary operator +.
11.	WAPC++ to overload the binary operator +.
12.	WAPC++ to overload the relational operator <.
13.	WAPC++ to overload the relational operator ==.
14.	WAPC++ to implement the idea of single inheritance with following constraints a. Member Variable(s) to be declared in private section

	b. Member Methods for input and output operations to be declared in public section c. Member methods for non input and output operations to be declared in non public section d. Mode of inheritance has to be i. Public ii. Private iii. Protected
15.	WAPC++ to implement the idea of multiple inheritance with following constraints a. Member Variable(s) to be declared in private section b. Member Methods for input and output operations to be declared in public section c. Member methods for non input and output operations to be declared in non public section d. Mode of inheritance has to be i. Public ii. Private iii. Protected
16.	WAPC++ to resolve the ambiguity if arises due to the presence of same member identification in multiple base classes.
17.	WAPC++ to implement the idea of hierarchical inheritance with following constraints a. Member Variable(s) to be declared in private section b. Member Methods for input and output operations to be declared in public section c. Member methods for non input and output operations to be declared in non public section d. Mode of inheritance has to be i. Public ii. Private iii. Protected
18.	WAPC++ to implement the idea of multi level inheritance with following constraints a. Member Variable(s) to be declared in private section b. Member Methods for input and output operations to be declared in public section c. Member methods for non input and output operations to be declared in non public section d. Mode of inheritance has to be i. Public ii. Private iii. Protected
19.	WAPC++ to implement the idea of hybrid inheritance with following constraints a. Member Variable(s) to be declared in private section b. Member Methods for input and output operations to be declared in public section c. Member methods for non input and output operations to be declared in non public section d. Mode of inheritance has to be i. Public ii. Private iii. Protected

	Resolve the ambiguity coming out due to multi path inheritance.
20.	WAPC++ to show the order of execution of constructors in case of multiple inheritance.
21.	WAPC++ to access the member variables of class using non member function (friend) of the class.
22.	WAPC++ to show the concept of nesting of class (containership).
23.	WAPC+ to show the use of pointer variable and an address of operator.
24.	WAPC+ to show the use of address operator address operator & and indirection operator *.
25.	WAPC+ to show the use of array of pointers.
26.	WAPC++ to show the use of operators like “new” and “delete”.
27.	WAPC+ to show the use of pointer to an array.
28.	WAPC+ to show the use of pointer to a string.
29.	WAPC++ to show the use of pointers to pointers.
30.	WAPC++ to pass values as arguments to the called function.
31.	WAPC++ to pass alias (reference) as arguments to the called function.
32.	WAPC++ to pass objects as arguments to the function and return objects.
33.	WAPC++ to pass pointers as arguments to the called function.
34.	WAPC++ to access the member variables of an object using pointer to the object.
35.	WAPC+ to show the use of array of pointers to objects.
36.	WAPC++ to implement the concept of self referencing pointers in context of class.
37.	WAPC++ to show the use to of “this” pointer.
38.	WAPC++ to show the use of pointer to base class object to be the pointer to the derived class objects.
39.	WAPC++ to implement the concept of polymorphism a. Compile Time b. Runtime
40.	WAPC++ to implement the idea of virtual WAPC++ to show the use of Abstract Data Type.
41.	WAPC++ to show the use of Abstract Data Type.
42.	WAPC++ to open a file called studentinfo.txt in write mode, read a record (data values like name and age) of student and write is in the file.
43.	WAPC++ to open a file called studentinfo.txt in append mode, read a record (data values like name and age) of student and append the record.
44.	WAPC++ to open the file studentinfo.txt in read mode, read the contents and display the data onto monitor.
45.	WAPC++ to open the file studentin.txt in read mode and studentout.txt in write mode, read the contents of the file studentin.txt and write them in the file studentout.txt.

OR

B. LAB ON JAVA PROGRAMMING

Practical: 60 Hours

Write a program in java for followings:

1. To illustrate Arithmetic, Relational, Boolean, Bitwise, Shift Operators.
2. To illustrate Precedence Rule.
3. To use "If-else" & "Switch Cases"
4. To use "For Loop", "While Loop" & "Do- While loop".
5. To use "Break" & "Labeled Break".
6. For class declaration & object initialization.
7. For calculating "simple interest" using class, object & methods.
8. For method overloading.
9. For matrix multiplication
10. For Nested classes.
11. For default constructor
12. For parameterized constructor
13. For constructor overloading
14. For final
15. For single Inheritance
16. For multilevel inheritance
17. For super
18. For hierarchical inheritances
19. For multiple inheritance using interface class
20. For hybrid inheritances using interface class
21. For method of overriding.
22. For Encapsulation.
23. For Abstract Class & Abstract Methods.
24. For class implementing interface.
25. For using inbuilt packages. E.g. Fact, Static, Import etc.
26. For Wrapper classes.
27. For Declaration, Creation, Finding Length, Comparison, Region Matching, Index of Character, occurrence of particular string, character at particular position, Test for Equality related to string.
28. For Try-Catch, Multiple Catch, Throw &Rethrow Exception, Finally, User Defined Exception, Exception Encapsulation.

29. For creating Thread.
30. File Handling
31. Database Connectivity

Reference Books:

- Deitel-Java How to Program, Pearson Education, New Delhi.
  E. Balagurusamy-Java Programming, TMH, New Delhi, 2005.

SEMESTER III **4 Papers**

Total 100 x 4 = 400 Marks

I. CORE COURSE – C6 [CCMIT 301]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

COMPUTER COMMUNICATION AND NETWORK Theory: 45 Lectures; Tutorial: 15 Hours

Unit - I Data Communications and Networking Basics: Fundamental concept of Communications Model, Data Communications & Networking.

Protocol Architecture: A Basic Protocol Architecture, OSI, the TCP/IP Protocol Architecture

Unit - II Transmission of Data: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity.

Guided and Wireless Transmission: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission.

Unit - III Signal Encoding Techniques: Digital Data Digital Signals, Digital Data Analog Signals, Analog Data Digital Signals, Analog Data Analog Signals.

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction, Line Configurations, Interfacing.

Unit –IV Data Link Control: Flow Control, Error Control, High-Level Data Link Control (HDLC). **Multiplexing:** Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing

Unit – V Circuit Switching and Packet Switching: Switching Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Control Signaling, Soft switch Architecture, Packet-Switching Principles, X.25, Frame Relay.

Unit –VI Asynchronous Transfer Model: Protocol Architecture, ATM Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Service Categories, ATM Adaptation Layer.

Unit –VI Routing in Switched Networks: Routing in Circuit-Switching Networks, Routing in Packet-Switching Networks, Least-Cost Algorithms

Text Book :

- W. Stallings - Data and Computer Communications, 7th Edn., Pearson Edn./ PHI, New Delhi, 2006

Reference Books:

- B. A. Forouzan - Data Communications and Networking, 4th Edn. TMH, New Delhi 2006
- P.C. Gupta – Data Communications and Computer Networks, PHI, New Delhi 2006.

II. CORE COURSE – C7 [CCMIT 302]: (Credits: Theory-04)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):
There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

ADVANCE JAVA PROGRAMMING

Theory: 45 Lectures; Tutorial: 15 Hours

Unit I Components and Facilities or Rich Graphical User Interface: Programming with the JFC, Swing API Components, Jcomponents Class, Dialog boxes, Panels, Labels, Checkboxes, Menus, Toolbars and Actions, Sliders, Spinners, Progress bars, Scrollbars, List and Combo boxes, Text-entry Components, Colour and File Choosers, Tables and Trees, Printing with 2D API, Java Print Service API.

Unit II Using Relational Database: Introduction, Best Practices for Programming forDatabases, JDBC Drivers for RDBM Systems, SQL to Java type Mapping, Understanding the Database used in this chapter, Using the **java.sql** API, Coding Transactions, Using the **javax.sql** API, Connection Pooling.

Unit III XML: Introduction, XML structure, XML example document with SAX, Parsing anXML Document with DOM, Generating an XML document with DOM, Validating XML Documents using DTD and XML schema, Transforming XML using XSLT.

Unit IV Building Web Applications: Introduction, The technology of Web, J2EE WebApplication Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Framework for Building Web Applications, Building Robust Web Apps.

Unit V Enterprise JavaBeans: Introduction, Enterprise Programming, what are EJBs?Session EJBs, EJB Clients, Entity EJBs, Message Driven Beans, EJB Transactional Characteristics, EJB Security, Best Practices for Designing EJB-Based Application.

Reference Books:

- Wigglesworth & McMillan – JavaTM Programming Advanced Topics, 3rd Edn., India Edition, Thomson Education, New Delhi, 2007
- Uttam K. Roy- Advanced Java Programming, Oxford University Press, 2015

III. ELECTIVE COURSE - 3 [ECMIT 303]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

A. DISTRIBUTED DATABASE

Theory: 45 Lectures; Tutorial: 15 Hours

Unit– I Introduction to Distributed Data Processing: Advantages of DDB's, Problem areas.

Unit– II Distribute Database Management System Architecture: DBMS Standardization, Architectural models for DDBMS Distribute DBMS Architecture.

Unit– III Distributed Database Design: Design Strategies, Distribution design issues, Fragmentation, Allocation.

Unit– IV Semantic Data Control: view management, data security, Integrity control.

Unit– V Query processing and Optimization: Quarry Processing Problem, Characterization of Query Processors, Layers of query Processing, Query decomposition, Query Optimization, Centralized query optimization, Join ordering in fragment queries, Distributed Query Optimization Algorithms.

Unit –VI Transaction Management and Concurrency Control: Introduction, Properties, Serializability Theory, Locking Based Concurrency control Algorithm Time Stamp based concurrency control Algorithms, Dead Lock management.

Unit– VII Recovery and Reliability: Failures and fault tolerance in distributed system, Distributed & local reliability protocol, Sits failures, network partitioning.

Text Book:

- M. Tamer Ozsee, Patric Valduriez - Principle of Distributed Database Systems 2nd Edn., Pearson Education Asia,2001.
- Distributed Database principles & system, Stefano Ceri, Gluseppe Pelagatti(McGrawHill)

OR

III. ELECTIVE COURSE - 3 [ECMIT 303]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):
There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

B. ARTIFICIAL INTELLIGENCE

Theory: 45 Lectures; Tutorial: 15 Hours

Unit – I **Introduction and Problem Solving**: Various definitions of AI, Introduction to AI applications and AI techniques, Production systems, reasoning- forward and backward chaining.

Unit –II Intelligent Agents: Definition of a rational agent, reflex, model-based, goal-based and utility-based agents, environment .

Unit–III Search and Game Playing: Breadth first search, depth first search, iterative deepening, simulated annealing, genetic algorithm search, heuristic search, hill climbing, Best first search, A* algorithm, AO* algorithm, Minmax & game trees, refining minmax, Alpha-Beta pruning, constraint satisfaction.

Unit–IV Knowledge Representation: First order predicate Logic, resolution, unification, natural deduction system, refutation, logic programming, PROLOG, semantic networks, frame system, value inheritance, conceptual dependency, Ontologies.

Unit – V **Planning**: basic representation for planning, symbolic-centralized vs reactive-distributed, partial order planning algorithm.

Unit – VI **Uncertainty**: different types of uncertainty–degree of belief and degree of truth, conditional probability, probability axioms, probability distributions, and joint probability distributions, Bayes' rule, other approaches to modeling uncertainty such as Dempster-Shafer theory and fuzzy sets/logic.

Unit –VII Learning: Concept of learning, neural network, back propagation learning, application of neural network

Unit –VII Expert System: Need of expert system, Knowledge acquisition, MYCIN

Reference books:

S. Russel and P.Norvig, Artificial Intelligence: A modern Approach.
Elain Rich and Kelvin Knight, Artificial Intelligence.
Nils J Nilson, Artificial intelligence: A new Synthesis.
R. Akerkar, Introduction to Artificial intelligence.

OR

III. ELECTIVE COURSE - 3 [ECMIT 303]: (Credits: Theory-04)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

C. MACHINE LEARNING

Theory: 45 Lectures; Tutorial: 15 Hours

Unit-I Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications, pattern recognition concepts classification, regression, feature selection, supervised learning class conditional probability distributions, Examples of classifiers bayes optimal classifier and error, learning classification approaches.

Unit-II Linear machines: General and linear discriminants, decision regions, single layer neural network, linear separability, general gradient descent, perceptron learning algorithm, mean square criterion and widrow-Hoff learning algorithm; multi-Layer perceptrons: two-layers universal approximators, backpropagation learning, on-line, off-line error surface, important parameters.

Unit-III Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information, ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data .

Unit-IV Instance-based Learning: Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability.

Unit-V Machine learning concepts and limitations: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts, hypothesis class, target class, inductive bias, occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors,Tradeoff.

Unit-VI Machine learning assessment and Improvement: Statistical model selection, structural risk minimization, bootstrapping, bagging, boosting.

Unit-VII Support Vector Machines: Margin of a classifier, dual perceptron algorithm, learning nonlinear hypotheses with perceptron kernel functions, implicit non-linear feature space, theory, zero- Bayes, realizable infinite hypothesis class, finite covering, margin-based bounds on risk, maximal margin classifier.

Reference Books:

E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2006.
T. M. Mitchell, Machine Learning, McGraw-Hill, 1997.
C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

OR

III. ELECTIVE COURSE - 3 [ECMIT 303]: (Credits: Theory-04)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

D. OPTIMIZATIONTECHNIQUES

Theory: 45 Lectures; Tutorial: 15Hours

Unit I: Introduction & Linear Programming Formulation: Operation Research Definition and Decision Making, Scope and Application. Meaning and Definition of LPF, Basic Assumption, Application, Limitation, Linear Programming Model, Formulation of Linear Programming

Unit II: Linear Programming:

The Graphical Method : Definition, Graph of Linear Inequality, The Graphic Method of Solution of Linear Programming Problems

The Simplex Method : Definition, Fundamental Theorem, General Formulation, Matrix Form, Standard Form, Computational Aspect of Simplex Method, Simplex Method- Minimization Problem, Problems Based on Mixed Constraints, The Breaking in Simplex Method, Special Cases in Simplex Methods.

Unit III Duality and Sensitivity Analysis : Formulation of Dual from Primal, Economic Interpretation of Dual Problem, Sensitivity(Post-Optimality)Analysis.

Unit IV Transportation Problem: Transportation Model, Definition, Transportation Algorithm, Methods for Finding Initial Solution, Test for Optimality, Trans-shipment Problem

Unit V Assignment Problem: Introduction, Mathematical Model, Solution Methods of Assignment Problem, Cases in Assignment Problems, Travelling Salesman Problem.

Unit VI Decision Theory: Introduction, Structure of Decision Making Problem, Optimism Criterian (Maximax/ Minimin Criterion), Pessimism Criterion or Wald Criterion, Minimax Regret Criterion, Laplace Criterion, Hurwicz Criterion, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information, Decision Trees.

Game Theory: Game Theory Concept, Pure Strategy Games (With Saddle Point), Mixed Strategy Games(without Saddle Point)

Unit VII Project Management CPM and PERT: Network Analysis Concept, Critical Path Analysis, Programme Evaluation and Review Technique (PERT), Network Crashing (Time-Cost Trade-off), UpdatingNetwork.

NLPP: Introduction, Formulality a NLPP, General NLPP, Constrained Optimization with Equality Constraints and Inequality constraints, Saddle Points. Kuhn – Tucker Conditions with Non Negative Constraints, Quadratic Programming, Wolfe's Modified Simplex Method.

Reference Books:

J.P. Singh, N.P. Singh- Operations Research, Ane's Books Pvt. Ltd.
Kanti Swarup, P.K. Gupta, Man Mohan – "Opeations Reaearch, Sultan Chand & Sons, New Delhi
Ronald L. Rardin "Optimization in Operations Research", pearson Education, New Delhi.
S.S. Rao, "Optimization Theory & Application", Wiley Eastern Ltd.

CORE COURSE (P) – C8 [CPMIT 304]: (Credits: Practical -05)

Marks: 100 **Pass Marks: 45**

End Semester Practical Examination (ESE Pr):

Lab: There will be **four** questions in Practical Examination of 3Hrs. out of which **any two** are to be answered. Students have to answer the given questions on answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 100 marks and will be so framed that the students are able to answer them within the stipulated time.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

LAB ON ADVANCE JAVA PROGRAMMING **Practical: 60 Hours**

1. Programming with the Java Tools Javaap, Jcmd, Jhat, Jdb, Jar
2. Java API Components AWT to create Components, Containers- window, frame, dialog, panel.
3. Swing J components Class, Dialog boxes, Panels, Labels, Checkboxes, Menus, Toolbars and Actions, Sliders, Spinners, Progress bars, Scrollbars, List and Combo boxes,
4. Text-entry Components,
5. Colour and File Choosers,
6. Tables and Trees, Printing with 2D API, Java Print Service API.
7. JDBC Drivers for RDBMS, SQL to Java type Mapping, Use of **java.sql**
8. XML structure, XML example document, Node interface, Document Node Methods, Element Node properties, Text Nodes. Parsing an XML Document with DOM tree, Generating an XML document with DOM, Validating XML Documents using DTD and XML schema, Transforming XML using XSLT.
9. Introduction, Working with URL connections, URL encoders and decoders.
10. Application Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Framework for Building Web Applications, Building Robust Web Apps.
11. Developing a simple Bean, create a source file for the new Bean, Create an instance of the colour Bean, Bean interfaces, Message Driven Beans, EJB-Based Application.

Reference Books:

- Wigglesworth & McMillan – JavaTM Programming Advanced Topics, 3rd Edn., India Edition, Thomson Education, New Delhi, 2007
- Uttam K. Roy- Advanced Java Programming, Oxford University Press, 2015
- Herbert Schildt The Complete Reference Java 2, 4th Edn, TMH.

SEMESTER IV **4 Papers**

Total 100 x 4 = 400 Marks

I. CORE COURSE – C9 [CCMIT 401]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):
There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

PYTHON PROGRAMMING **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit I Introduction to Python: The Python Language, The Python Standard Library and Extension Units, Python Implementations, Python Development and Versions, Python Resources.
The Python Language: Lexical Structure, Data types, Variables and Other References, Expression and Operators, Numeric Operations, Sequence Operations, Set Operations, Dictionary Operations, The print Statement, Control Flow Statements, Functions.
Object-Oriented Python: Classes and Instances, Special Methods, Decorators, Meta classes.

Unit II Exceptions: The TRY Statement, Exception Propagation, The Raise Statement, Exception Objects, Custom Exception Classes, Error-Checking Strategies.

Units: Unit Objects, Unit Loading, Packages, The Distribution Utilities (distutils).

Core Built-ins: Built-in types, Built-in Functions, The sys Unit, The copy Unit, The Collections Unit, The Functional Unit, The Bisect Unit, The Heapq Unit, The User Dict Unit, The Optparse Unit, The Itertools Unit.

Strings and Regular Expressions: Methods of String Objects, The String Unit, String Formatting, The Pprint Unit, The Repr Unit, Unicode, Regular Expressions and the Re Units.

Unit III File and Text Operations: Other chapters that also deal with Files, Organization of this Chapter, File Objects, Auxiliary Unit for File I/O, The String IO and cString IO Units, Compressed Files, The OS Unit, File System Operations, Text Input and Output, Richer-Text I/O, Interactive Command Sessions, Internationalization.

Persistence and Databases: Serialization, DBM Unit, Berkeley DB Interfacing, The Python Database API (DBAPI) 2.0
Unit IV Time Operation: The Time Unit, The Date Time Unit, The Pytz Unit, The dateutil Unit, The sched Unit, The calender Unit, Themx.DateTime Unit.

Controlling Execution: Dynamic Execution and the exec Statement, Internal Types, Garbage Collection, Termination Functions, Site and User Customization

Unit V Thread and Processes: Thread in Python, The thread Unit, The Queue Unit, The Threading Unit, Threaded Program Architecture, Process Environment, Running Other Programs, The map Unit.

Unit VI Numeric Processing: The Math and cMath Unit, The Operator Unit, Random and Pseudorandom numbers, The Decimal Unit, The gmpy Unit.

Array Processing: The Array Unit, Extensions for Numeric Array Computation, The NumericPackage, Array Objects, Universal Functions (ufuncs), Auxiliary Numeric Units.

Reference Books:

- 1.Alex Martelli- PYTHON IN A NUTSHELL,2ND Edition, O'REILLY, 2012
- 2.Mark Lutz-Python reference,5thedition,O'Reilly

II. ELECTIVE COURSE – EC4 [ECMIT 402]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

A. DATA WAREHOUSING AND DATA MINING **Theory: 45 Lectures;Tutorial: 15 Hour**

Unit –I Introduction : Data Warehousing Definition, Multidimensional Data Model, OLAP Operation, OLTP Operation, Warehouse Scheme, Data Warehousing Architecture, Metadata, OLAP ENGINE, Data warehouse Backend Process, OLAP Vs OLTP.

Unit –II Data Warehousing: Overview, Definition, Delivery Process, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.

Unit –III Data Mining: Introduction, Data Mining Definition, Motivation behind Data mining, Why is it important, KDD Vs, Data Mining, Data Mining Functionalities , DBMS Vs DM, other related area, DM Technique, Other Mining Problem, Issue and challenges are in DM, DM Application area, DM Application, Case Study.

Unit-IV Classification and Prediction: - Issues Regarding Classification and Prediction, Classification by Decision Tree , Rule Based Classification , Classification by Back propagation, Support Vector Machines, Lazy Learners , Prediction , Accuracy and Error Measures , Evaluating the Accuracy of a Classifier or Predictor.

Unit –V Clustering Techniques: Introduction, Clustering Paradigram, Generalized , Partition Algorithm, K-Medoid Algorithm, K- Mean Algorithm , CLARA, CLARANS, DBSCAN, BIRCH, CURE, Categorical Clustering Algorithms, STIRR, ROCK, CACTUS.

Unit –VI Mining Association Rule in Large Database: Introduction, What is an Association Rule, Method to discover association Rule, A Priori Algorithm, Partition Algorithm, Pinear-Search algorithm, Dynamic item set Counting Algorithm, FP Tree Growth?

Unit –VII Decision Trees: Introductions, Tree Construction Principle, Best split splitting Indices, Splitting criteria, Decision Tree Construction with Presenting, Pruning Technique, Integration of Pruning Technique and Construction.

Text Book

A.K. Pujari, A Data Mining Technique, University Press (India) Limited, 2001

Reference Book

- A Hand and M. Kamber? Data Mining Concept and Technique? Morgan Kauffman Publishers, Else River India, New Delhi, 2003.
- RecherdJ, Roiger and Michance W. Creatz, Data Mining: A tutorial Based Primer, Addision Wesley, 2003.
- M.H. Dienham, Data Mining: Introductory and Advanced Topics, Pentice Hall 2003.
- Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

OR

II. ELECTIVE COURSE – EC4 [ECMIT 402]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

AUTOMATA THEORY

Theory: 45 Lectures; Tutorial: 15 Hours

Unit –I Finite Automata : Finite Automata, capability & limitations of FSM, Deterministic Finite Automata , Non-Deterministic Finite Automata, NFA with e-moves, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c , Kleen's Theorem.

Unit – II Regular languages & Regular Grammars : Regular Expressions- Formal Definition & Language associated with It. Criterion for Regularity, Relation between Regular expression & Regular Language , Closure properties of regular grammar. Identifying Nonregular Language-using pigeonhole principle, Pumping Lemma.

Unit – III Context Free Grammars: Introduction, definition, Regular Grammar, Derivation trees, Ambiguity, Normal Forms, Applications.

Unit – IV Pushdown Automata : Definition, Moves, Instantaneous Descriptions, Language recognized by PDA, Deterministic PDA, Acceptance by final state & empty stack, Equivalence of PDA , Pumping lemma for CFL, Intersection and Complements of CFL.

Unit – V Turing Machines: Definition and examples, Computing Partial Functions with Turing Machine(TM), Combining TMs, Variations of TMs, Multi-tape TMs, Non-deterministic TM, Universal TM, Church Thesis.

Unit – VI Recursively Enumerable Languages: Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomosky Hierarchy.

Unit – VII Unsolvable Problems and Computable Functions: Non-recursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem.

Text Books:

- J.E. Hopcroft and J.D. Ullman -"Introduction to Automata Theory, Languages & Computation", Narosa.

Reference Books:

- K.L.P Mishra & N. Chandrasekharan -"Theory of Computer Science", PHI
- Peter Linz – " An Introduction to Formal Language and Automata", Narosa
- C.K. NAGPAL- Formal Language & Automata Theory, Oxford University Press
- Vivek Kulkarni- Theory of Computation, Oxford University Press
- Dasradh Ramaiah K. – Introduction to Automata Theory & Compiler Design, PHI

OR

II. ELECTIVE COURSE – EC4 [ECMIT 402]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).

The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

CLOUD COMPUTING

Theory: 45 Lectures; Tutorial: 15Hours

Unit I Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics Cloud Adoption.

Unit II Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure Self Service.
Cloud as a Service: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined.

Unit III Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloudsourcing.

Unit IV Cloud Offerings & Management : Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

Unit V Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual Infrastructure Requirements.

Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

Unit VI Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and IT Services.

Unit VII Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Text Book:

- K. Saurabh– Cloud Computing, 2nd Edn, Wiley India,2014.

Reference Books:

- T. Velte, A. Velte and R. Elsenpeter-Cloud Computing: A Practical Approach, McGraw Hill, India.
- Buyya, J. Broberg-Cloud Computing: Principles and Paradigms, Wiley. Derrick Rountree , LLeanacastrillo – The Basicsof Cloud Computing,Syngress
- ArshdeepBahga, Vijay Madisetti – Cloud Computing: A Hands onn Approach, Universities press

OR

II. ELECTIVE COURSE- EC4 [ECMIT 402]: (Credits: Theory-05)

Marks: 30 (SIA: 20Theory: 1Hr + 10Assignment) + 70 (ESE: 3Hrs) = 100

Instruction to Question Setter for
End Semester Examination (ESE):

There shall be total EIGHT (08) questions in each End-Semester Examinations. Examinees are required to answer any FIVE (05) questions out of EIGHT (08).
The questions must cover the entire syllabus with equal distribution of marks as far as practicable.

INTERNET OF THINGS

Theory: 45 Lectures; Tutorial: 15Hours

Unit I: Introduction and Concepts : Definition and Characteristic, Physical Design- Things in IoT, IoT Protocols; Logical Design- IoT Functional Blocks, IoT Communication Models and APIs; IoT Enabling Technologies- Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems; IoT Levels & Deployment Templates.

Unit II: Introduction to sensors, Transducers, Classification, Roles of sensors in IOT, Various types of sensors, Design of sensors, sensor architecture, special requirements for IOT sensors, Role of actuators, types of actuators.

Unit III: Protocol Standardization for IoT :M2M and WSN Protocols, RFID Protocols & NFC protocols, Issues with IoT Standardization ,Unified Data Standards ,Protocols – IEEE 802.15.4, Zigbee, IPv6 technologies for the IoT, IPv6 over low-power WPAN (6LoWPAN) Hardwire the sensors with different protocols such as HART, MODBUS-Serial & Parallel, Ethernet, BAC Net , Current, M2M etc.

Unit IV: IOT Analytics Role of Analytics in IOT, Data visualization Techniques, Introduction to R Programming, Statistical Methods

Unit V: IoT & M2M: Introduction, M2M, Differences between Iot and M2M, SDN (Software Defined Networking) and NFV (Network Function Virtualization) for Iot

Unit VI: IoT System Management with NETCONF-YANG: Need for Iot Systems Management, Simple Network Management Protocol (SNMP)- Limitations; Network Operator Requirements, NETCONF, YANG,NETOPEER.

IoT Platforms Design Methodology: Introduction, IoT Design Methodology, IoT System for Weather Monitoring

Unit VII: IoT Physical Devices & Endpoints: Basic Building Block of IoT Device, Exemplary Device, Arduino Interfaces, Hardware requirement for Arduino, Connecting remotely over the network using VNC, GPIO Basics, Controlling GPIO Outputs Using a Web Interface, – Programming, APIs / Packages, Introduction to Raspberry Pi Interfaces, Beagle bone InterfacesLinuxonRaspberryPi,RaspberryPiInterfaces-Serial,SPI,I2C;ProgrammingRaspberryPi; with Python- Controlling LED with Raspberry Pi, Interfacing LED & Light Sensor(LDR) and Switch with Raspberry Pi; Other IoT Devices- pc Duino, Beagle Bone Black, Cubie board.

Unit VIII Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements, Threat analysis, Use cases and misuse cases.

Unit IX : IoT Applications: Introduction, Home Automation- Smart Lighting & Appliances, Intrusion Detection, Smoke/Gas Detectors; Cities- Smart Parking, Smart Lighting & Roads, Structural Health Monitoring, Surveillance, Emergency Response; Environment- Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection, River Floods Detection; Energy- Smart Grids, Renewable energy Systems, Prognostics; Logistics;

Retail- Inventory Management, Smart Payments, Smart Vending Machines; Logistics- Route Generation & Scheduling, Fleet Tracking, Shipment Monitoring, Remote Vehicle Diagnostics; Agriculture- Smart Irrigation, Green House Control; Industry- Machine Diagnosis & Prognosis, Indoor Air Quality Monitoring; Health & Lifestyle- Health & Fitness Monitoring, Wearable Electronics;

Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IOT in Manufacturing Sector

Unit X: IoT Physical Servers and Cloud Offerings: Cloud Storage Models & Communication APIs, WAMP Auto Bahn for IoT, Xively Cloud for IoT, Python Web Application Framework- Django Architecture, Starting Development with Django; Designing a RESTful Wen API, Amazon Web Services for IoT- EC2, Auto Scaling, S3, RDS, Dynamo DB, Kinesis, SQS, EMR; Sky Net IoT Messaging Platform.

Unit XI : Illustrating IoT Design : Introduction, Home Automation- Smart Lighting, Home Intrusion Detection; Cities- Smart Parking; Environment- Weather Monitoring System, Weather Reporting Bot, Air Pollution Monitoring, Forest Fire Detection; Agriculture- Smart Irrigation; Productivity Application- Iot Printer.

Reference Books:

- *ArshdeepBahga& Vijay Madisetti- Internet of Things: A hands-on Approach, 2015, Universitiespress*

CORE COURSE (P) – C9 [CPMIT 403]: (Credits: Practical -05)

Marks: 100

End Semester Practical Examination (ESE Pr):

Lab: There will be **four** questions in Practical Examination of 3Hrs. out of which **any two** are to be answered. Students have to answer the given questions on answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 100 marks and will be so framed that the students are able to answer them within the stipulated time.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

PYTHON PROGRAMMING LAB — Practical: 60 Hours

Programming based on the following:-

1. Data types, Variables and Other References, Expression and Operators,
2. Numeric Operations, Sequence Operations, Strings, Tuples, List, Set Operations, Dictionary Operations,
3. The print, Control Flow Statements, while, for, break, continue for, pass try, raise, with
4. Functions, lambda expressions, generators, attributes.
5. Classes and Instances, bound, unbound, overriding, superclass Methods, Decorators, Metaclasses.
6. Try, raise, with exceptions, Exceptions objects, Standard and custom Exception classes.
7. Units, Import, from, import*, statements, Python built-in Units sys, copy, Collections Unit, Functional Unit, Bisect Unit, Heapq Unit, User Dict Unit, Optparse Unit, Itertools Unit.
8. Methods of String Objects, String Unit, String Formatting, Pprint Unit, Repr Unit, Unicode, Regular Expressions and the Re Units.
9. File and Text Operations: Creating aFiles object with open, Auxiliary Unit for File I/O, The String IO and cString IO Units, Text Input and Output, Richer-Text I/O, Interactive Command Sessions, Internationalization.
10. Persistence and Databases**:** marshal, pickle, any dbm Unit, The Python Database API
11. Time Operation**:** time, datetime, pytz, dateutil, sched, calender, mx. Date Time Unit.
12. Controlling Execution**:** exec Statement, co, _code, co_filename, code_object, gc Unit, weakref, proxy, register.
13. Thread and Processes**:** thread, Queue, Threading, map Unit.
14. Numeric Processing**:** The math and cmath Unit, operator Unit, Random and Pseudorandom numbers, Decimal, gmpy Unit.
15. Array Processing**:** array Unit, extensions for Numeric Array Computation, Numeric Package, Array Objects, Universal Functions (ufuncs), Auxiliary Numeric Units.

Reference Books:

- Alex Martelli- PYTHON IN A NUTSHELL,2ND Edition, O'REILLY, 2012

CORE COURSE PROJECT (P) – CP10 (CPMIT 404)

(Credits: Practical -05)

Marks: 100

Guidelines to Examiners for
End Semester Examination (ESE):
Overall project dissertation may be evaluated under the following heads:

- *Motivation for the choice of topic*
- *Project dissertation design*
- *Methodology and Content depth*
- *Results and Discussion*
- *Future Scope & References*
- *Participation in Field Training Programme*
- *Application of Research technique in Data collection*
- *Report Presentation*
- *Presentation style*
- *Viva-voce*

Distribution of Marks:

OJT Project Report (By External)		(Total = 70 marks)
1.	Formulation of Project Design	= 25
2.	Implementation of the Design	= 25
3.	Presentation of Report	= 20
G.D. and Viva Voce Examination (By Internal)		(Total = 30 marks)
1.	Presentation & Viva	= 20
2.	Marks given by Internal Supervisor (based on cumulative assessment)	= 10

Note: There will be only one internal examination of 100 marks for this paper.

FINAL PROJECT AND INTERNSHIP

A. ON JOB TRAINING (OJT):

1. OJT is **ON JOB TRANING**, Student have to do two months (**OJT Six Month**) industrial Training from IT origination (**Reference letter for OJT of must be issued from Concern Department**). Student has to produce daily report. In this daily report, Attendee sheet, Work culture and working hour list, day by day, must be listed.
2. Student alone or in a group of not more than three, shall undertake **One Project Dissertation** approved by the Subject Teacher/H.O.D. of the Department/College concerned. The progress of the Project Dissertation shall be monitored by the faculty members at regular intervals, and followed by Internal Viva Examination of 30 marks.

Academic Credits for training shall be based on following:

A **Power Point presentation** (based on the report) for duration of **10 minutes** should be make. This will be presented in front of examiners. Marks will be awarded on this presentation and documents submitted to the faculty coordinator at the institute.

PRE SUBMISSION SEMINAR

This paper is meant for realising all basic and advanced concepts studied so far by providing software enabled solution on the topic or situation or real problem and become confident enough to overcome challenges of Software industries.

Every student will have to do Mini Project by selecting any topic of his choice under the supervision of internal guide/teacher and to present a report for evaluation prior to the End Semester University Examination. The distribution of marks will be as given above:

Selection of Internal Guide:

The student has to approach to faculty members for his/her consent for internal guide.

Instruction to the guide:

Each faculty member will give consent for internal guide to a maximum no. of candidates as per following condition:

Maximum No. of candidates/Faculty member = Total No. of Students/ Total No. of Faculty members.

Students have to submit the following on completion of training to the concern faculty at the college:

1. Synopsis submission
2. Synopsis Approval will be given within a week from the date of submission.
3. Synopsis will be approved by concerned department faculty member.
4. Faculty members will be the internal guide of particular group of Students.
5. The group size will be maximum of 3 candidates.
6. Group will present power point presentation in front of panel and submit the project status report within the 15 to 20 days from the date of approval.
7. Final Project Submission contains Hard copy, Soft copy & leave letter. Project hard copy contains
   a) Front page
   b) Certificate of Authenticity
   c) Certificate of job Training
   d) Declaration
   e) Acknowledgement
   f) Table of content/index
   g) Project guidelines (These points are mandatory)
      (i). Introduction with Company profile.
      (ii). Vision, mission & objective.
      (iii). SWOT Analysis.
      (iv). Chronology of Achievements.
      (v). Topic introduction & discussion.
      (vi). Its relevance & implication in company.
      (vii). Findings.
      (viii). Conclusion
      (ix). Further enhancement (Suggestion).
      (x). Bibliography
      (xi). Reference Website
      (xii). CD (compact Disc)
   h) The file should be Book Binding .One Project Report for office copy and each candidate must have its own copy.
8. Leave Card.

The Training Report will be submitted in the form specified as under:

a. The typing should be done on both sides of the paper(instead of single side printing)
b. The font size should be12 with Times New Roman font.
c. The Training Report may be typed in 1.5 line spacing.
d. The paper should be A-4size.

Two copies meant for the purpose of evaluation may be bound in paper and submitted to the approved authority.