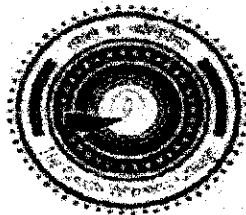


Ranchi Women's College, Ranchi

(An Autonomous Unit of Ranchi University from 2012)



Courses of Study

For

Master of Science in Information Technology

Choice Based Credit System

(Session 2021-2023)

Under

Department. of Information Technology

Semester:- 4


(CC: 10, EC: 04, Seminar/Project: 01)

Minutes of Meeting

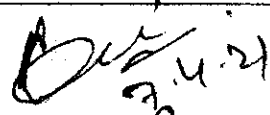
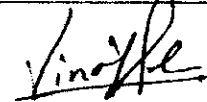
A meeting of **Board of Studies** was held in the Department on 07-04-2021 at 03:00 pm onwards to review the syllabus of M.Sc. (IT) (Master of Science in Information Technology).

The members present were:-

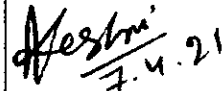
University Nominee:-

S. No.	Name	Designation	Signature
1.	Dr. A.K. Jha	Associate Professor, Department of Mathematics, Ranchi University, Ranchi	




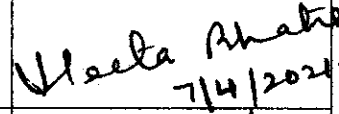
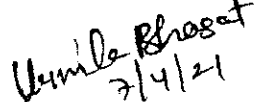
Subject Experts:-

2.	Dr. Birendra Goswami	Assistant Professor, Dept. of Computer Science, ICFAI, Ranchi.	
3.	Dr. Vinay Singh	Assistant Professor, Department of Computer Science, Usha Martin University, Ranchi	


Coordinator:-

4.	Dr. Asha Lata Keshri (Information Technology)	Coordinator, Information Technology, Ranchi Women's College, Ranchi	
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Faculties:-

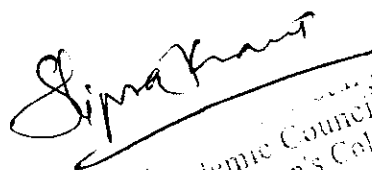
5.	Ms. Dolly Kumari (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
6.	Ms. Purnima Kumari Srivastava (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
7.	Ms. Mamata Pandey (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	
8.	Dr. Meeta Bhatia (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	
9.	Ms. Urmila Bhagat (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	


Representative from Industry/ Allied Field:-

10.	Mr. Niranjana Khushwaha	Network and Security, Administrative	
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Agenda : Discussion and approval of the syllabus (Developed by RU) based on CBCS guidelines.

Resolution : CBCS Syllabus was approved with minor changes.


Chairperson
Academic Council
Ranchi Women's College


CHAIRPERSON
ACADEMIC COUNCIL
RANCHI WOMEN'S COLLEGE

Department of Information Technology
SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
(Syllabus for 2 yr Degree Course: Master of Science in Information Technology)

A meeting of board of Studies was held in the Department of Information Technology, Ranchi Women's College, Ranchi on 07-04-2021 at onwards to review the syllabus of Master of Science in Information Technology. The Resolution Passed in the meeting was regarding modification and review of syllabus in Sem-I to Sem-IV.

The details in the modification in the syllabus of Sem-I to Sem-IV are as follows:

Semester	PAPER	PAPER CODE	NAME OF PAPER		CREDIT	Remarks
			Old(2020)	New(2021)		
I	Foundation course	MIT FC	Computer Organization and Architecture	Computer Organization and Architecture	5	No change
	Core course	MIT CC 101	Database Management System	Database Management System	5	added some topics like Big Data Analytic, Data Warehousing and Mining
	Core course	MIT CC 102	Data Structure through C	Data Structure through C	5	No change
	Practical's on Core	MIT CC 103(PR)	Lab on Paper101 and paper 102	Lab on Paper102 and paper 103	5	No change
II	Core course	MIT CC 204	Operating System	Operating System	5	No change
	Core course	MIT CC 205	JAVA	JAVA	5	unit rearranged, and added Advance Java with the topics java database connectivity and Introduction to EJB
	Elective	MIT EC 201	Software Engineering	Software Engineering	5	No change
	Practical's on Core	MIT CC 206(PR)	Lab on Paper 204 and paper 205	Lab on Paper 201 and paper 202	5	No change
III	Ability Enhancement Course	MIT EC 302	Technical English Communication	Programming with Python	5	Replaced paper on Technical English Communication with Programming with Python
	Core course	MIT CC 307	Formal Language Automata Theory	Formal Language Automata Theory	5	No Change
	Core course	MIT CC 308	Data Communication and Networking	Data Communication and Networking	5	No change
	Practical's on Core	MIT CC 309(PR)	Lab on C# programming	Programming with python Lab	5	Replaced lab paper on Lab on C# programming with programming with python
IV	Elective	MIT EC 403	Artificial Intelligence	Artificial Intelligence	5	No change
	Core course	MIT CC 410	Enterprise Resource Planning and Big Data Analysis	IPR with Business Communication and Management	5	Replaced paper on Enterprise Resource planning and Big Data Analysis with IPR with Business Communication and Management
	Elective	MIT EC 404	Operation Research	Discrete Structure with Optimization Technique	5	Replaced paper on Operation Research with Discrete Structure with Optimization Technique
	Project	Project	Dissertation/Project and Seminar/ On-Job-Training	Dissertation/Project and Seminar/ On-Job-Training	5	No change

Program Specific Outcomes

- Design and develop applications to analyze and solve all computer science related problems
- Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data
- Communicate effectively and present technical information in oral and written reports
- Apply the knowledge of computer application to find solutions for real-life application
- Ability to analyze, design, develop and maintain the software application with latest technologies
- Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.
- Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

Course Outcomes

Semester	Paper Code & Paper Name	Remarks (After the completion of this course, students will be able to:)
Sem I	MIT FC – Computer Organization and Architecture	<ul style="list-style-type: none"> • Understanding of digital system, its organization and architecture. • Apply knowledge of digital electronics logic gate to combinational and sequential circuits. • Illustrate the concept of processing I/O organization and different way of communicating with I/O devices and standard I/O interface
	MIT CC 101 – Database Management System	<ul style="list-style-type: none"> • Construct an Entity-Relationship (E-R) model from specifications and to transform to relational model. • Construct unary/binary/set/aggregate queries in relational algebra. • Understand and apply database normalization principles. • Understand principles of database transaction management, database recovery, security. • Analyze Data Base design methodology. • knowledge of SQL Commands
	MIT CC 102 – Data Structure through C	<ul style="list-style-type: none"> • To access how the choices of data structure & algorithm methods impact the performance of program. • To Solve problems based upon different data structure & also write programs. • Design and analyze the time and space efficiency of the data structure • Apply graph and tree traverse technique to various applications.
	MIT CC 103 (PR) – Lab on DBMS & DS	<ul style="list-style-type: none"> • Design and analyze the time and space efficiency of various data structures • Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and quick sort • Program for sorting, searching etc. <p>Use data manipulation language to query , update and manage a database.</p>
Sem II	MIT CC 204 – Operating System	<ul style="list-style-type: none"> • Describe the main components of OS and their working • Explain the concepts of process and thread and their scheduling policies • Explain the various memory management techniques. • Compare the different techniques for managing memory, I/O, disk and files. • Explains the security and protection features of an Operating System.
	MIT CC 205 – JAVA	<ul style="list-style-type: none"> • To understand fundamentals of object-oriented programming in Java, including defining classes, methods, using class libraries, exception handling etc. • Demonstrate simple data structures like arrays in a Java program • Understand the concept of package, interface, multithreading and File handling in java.
	MIT EC 201 – Software Engineering	<ul style="list-style-type: none"> • Explain the software engineering principles and techniques • Apply Software Project Management Practices • Apply the knowledge gained for their project work as well as to develop software following software engineering standards • Analyze various methods of software testing strategies
	MIT CC 206 (PR) – Lab on OS & JAVA	<ul style="list-style-type: none"> • Explain basic concepts of object-oriented programming. • Use the characteristics of an object-oriented programming language in a program. • Use the basic object-oriented design principles in computer problem solving • Develop their own Applications /Projects using JAVA
Sem III	MIT EC 302 – Programming	<ul style="list-style-type: none"> • Read, Write and execute simple pythons programs

	with Python	<ul style="list-style-type: none"> • Decompose a Python program into functions, operators, looping etc. • simple python programming using Database
	MIT CC 307 – Formal Language Automata Theory	<ul style="list-style-type: none"> • Relate formal languages and mathematical models of computation • Attain knowledge about different types of languages and the corresponding machines • Learn about the pushdown machine, Turing Machine and its role in compiler construction • Analyse classes of P, NP, NP-C and NP-Hard problems
	MIT CC 308 – Data Communication and Networking	<ul style="list-style-type: none"> • Explain how communication works in computer networks and to understand the basic terminology of computer networks • Understand design issues in network security and to understand security threats, security services and mechanisms to counter. • Familiar with basic devices like repeaters, bridges, gateways and quality of service • Understand the network security, common threats, firewalls, and cryptography
	MIT CC 309 (PR) – Programming with python lab	<ul style="list-style-type: none"> • Illustrate the essentials of the Python library, and learn how to learn about other part of the library when you need them • Demonstrate simple python programming using Database
SEM IV	MIT EC 403 – Artificial Intelligence	<ul style="list-style-type: none"> • Knowledge of the building blocks of AI • Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them. • Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
	MIT CC 410 – IPR with Business Communication and Management	<ul style="list-style-type: none"> • Understand Intellectual Property assets. • Assist individuals and organizations in capacity building. • Distinguish information across organizations. • Work for development, promotion, protection, compliance, and enforcement of Intellectual Property and Patenting. • Apply business communication strategies and principles to prepare effective communication for domestic and international business situations. • Participate in team activities that lead to the development of collaborative work skills. • Communicate via electronic mail, Internet, and other technologies and deliver an effective oral business presentation.
	MIT EC 404 – Discrete Structure with Optimization Technique	<ul style="list-style-type: none"> • Apply the operations of sets and use Venn diagrams to solve applied problems, solve problems using the principle of inclusion – exclusion. • Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle, • Determine if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic, and determine the connectivity of a graph.
	Project	<ul style="list-style-type: none"> • It makes the student confident in designing an Online Project. • Students are trained to meet the requirements of the Industry.

COURSES OF STUDY

For Subject with Practical

Subject: INFORMATION TECHNOLOGY

UNIVERSITY DEPARTMENT OF INFORMATION TECHNOLOGY

FIRST SEMESTER

PAPER	SUBJECT CODE	NAME	NO OF CREDITS	TEACHING HOURS PER WEEK	MINIMUM TEACHING REQUIRED
1	MIT FC	Computer Organization and Architecture	5	5	60
2	MIT CC 101	Database Management System	5	5	60
3	MIT CC 102	Data Structure through C	5	5	60
4	MITCC 103(PR)	Lab on Paper101 and paper 102	5	5	60*

SECOND SEMESTER

PAPER	SUBJECT CODE	NAME	NO OF CREDITS	TEACHING HOURS PER WEEK	MINIMUM TEACHING REQUIRED
5	MIT CC 204	Operating System	5	5	60
6	MIT CC 205	JAVA	5	5	60
7	MIT EC 201	Software Engineering	5	5	60
8	MITCC 206(PR)	Lab on Paper 204 and paper 205	5	5	60*

THIRD SEMESTER

PAPER	SUBJECT CODE	NAME	NO OF CREDITS	TEACHING HOURS PER WEEK	MINIMUM TEACHING REQUIRED
9	MIT EC 302	Programming with Python	5	5	60
10	MIT CC 307	Formal Language Automata Theory	5	5	60
11	MIT CC 308	Data Communication and Networking	5	5	60
12	MIT CC 309 (PR)	Lab on python programming	5	5	60*

FOURTH SEMESTER

PAPER	SUBJECT CODE	NAME	NO OF CREDITS	TEACHING HOURS PER WEEK	MINIMUM TEACHING REQUIRED
13	MIT EC 403	Artificial Intelligence	5	5	60
14	MIT CC 410	IPR with Business Communication and Management	5	5	60
15	MIT EC 404	Discrete Structure with Optimization Technique	5	5	60
16	PROJECT	Dissertation/Project, Seminar and On-Job-Training	5	5	60*

- *: Practical: one Practical Of Two Periods.

COURSES OF STUDY**For Subject with Practical****Subject: INFORMATION TECHNOLOGY****Table: Semester wise Marks Distribution for Mid Sem & End Sem Examination:**

SE ME STE R	PAPER CODE	PAPER	CREDIT	NAME OF PAPER	EXAMINATION STRUCTURE		
					MID SEMESTE R EVALUAT ION	END SEMESTE R EVALUAT ION	END SEMESTER PRACTICAL /VIVA(F.M)
I	MIT FC	Foundation course	5	Computer Organization and Architecture	30	70	----
	MIT CC 101	Core course	5	Database Management System	30	70	----
	MIT CC 102	Core course	5	Data Structure through C	30	70	----
	MIT CC 103(PR)	Practical's on Core	5	Lab on Paper101 and paper 102	----	----	70+30
II	MIT CC 204	Core course	5	Operating System	30	70	----
	MIT CC 205	Core course	5	JAVA	30	70	----
	MIT EC 201	Elective	5	Software Engineering	30	70	----
	MIT CC 206(PR)	Practical's on Core	5	Lab on Paper 204 and paper 205	----	----	70 + 30
III	MIT EC 302	Ability Enhancement Course	5	Programming with Python	30	70	----
	MIT CC 307	Core course	5	Formal Language Automata Theory	30	70	----
	MIT CC 308	Core course	5	Data Communication and Networking	30	70	----
	MIT CC 309(PR)	Practical's on Core	5	Programming with Python Lab	----	----	70 + 30
IV	MIT EC 403	Elective	5	Artificial Intelligence	30	70	----
	MITCC 410	Core course	5	IPR with Business Communication and Management	30	70	----
	MIT EC 404	Elective	5	Discrete Structure with Optimization Technique	----	----	70 + 30
	PROJECT	Project	5	Dissertation/Project and Seminar/ On-Job-Training	----	----	70 + 30

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 1st SEMESTER**

Subject Code- MIT FC Subject Name- Computer Organization and Architecture (Credits : Theory - 0 5)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd., 5 marks).

Unit 1: Introduction: Organization and Architecture, Structure and Function, A Top-Level view of Computer Function and Interconnection: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI.

Unit 2: Cache Memory: Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design, Pentium 4 and PowerPC Cache Organizations. Internal Memory: Semiconductor Main Memory, Error Correction, Advanced DRAM Organization.

Unit 4: External Memory: Magnetic Disk, RAID, Optical Memory, Magnetic Tape.

Input/Output: External Devices, I/Os, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors.

Unit 5: Computer Arithmetic: The Arithmetic and Logic Unit, Integer Representation, Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic.

Unit 6: Instruction Sets- Three-address and one address instructions, general – purpose register architecture (the classic RISC) and accumulator architecture. Zero – address instructions and the stack architecture. Two – address instructions., reduced instruction set computers (RISC), complex instruction set computers (CISC).

Unit 7: Processor Structure and Function: Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The Pentium Processor

Textbook:

1. M. Morris Mano, Computer System Architecture, PHI.

Reference Book:

1. J. P Hays, Computer Architecture and organization, McGraw Hill.
2. "Computer Organization" V.C. Hamchar. TMH

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 1ST SEMESTER**

Subject Code-MIT CC-101 Subject Name- Database Management System (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be veryshort answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd., 5 marks).

Unit 1: 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 2: Data Modeling: Entities and Entity Sets, Relationships and Relationship Sets, Keys, Mapping, Constraints, ER Diagram, Reducing ER Diagram to tables, Generalization and Specialization, Aggregation. Conceptual object modeling using UML class diagrams knowledge representation concepts.

Unit 3: 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 4: 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, lossy and lossless 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 5: Security & Integrity: Security & Integrity violations, authorization and views, integrity constraints, encryption, Statistical databases.

Unit 6: Transaction Processing, Concurrency Control: Transaction Processing, Schedules and Recovery, Locking and Timestamp Ordering for concurrency control.

Unit 7: Database Recovery Techniques: failure, recovery and atomicity, recovery algorithm, ARIES, remote backup

Unit 8: Data Warehousing and Mining: classification, association rule and clustering

Unit 9- Big Data Analytic: introduction, cloud and big data, Hadoop, RDBMS and big data, big data analysis and data warehouse

Text Book:

1. Fundamentals of Database Systems "RamezElmasri", Pearson Education

Reference Book:

1. Database Systems Concepts "ASilberschatz, Korth", McGraw Hill.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 1ST SEMESTER**

Subject Code-MIT CC-102 Subject Name- Data Structure through C(Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Mid Semester Examination (MSF):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

***Note:** There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Unit 1: Introduction: Pseudopodia, The Abstract data type, A Model for an abstract data type, Algorithm efficiency

Unit 2: Searching: Arrays, List Searches, Hashed list searches and Collision Resolution

Unit 3: Linked List: Linear List concept, Linked list concept, Linked list algorithms, Processing a linked list, List applications, List abstract data type.

Unit 4: Recursion: Programs through recursion, design of recursive algorithms, The towers of Hanoi.

Unit 5: Stacks and Queues: Basic stack operation, stack linked list implantation, Stack applications, Stack abstract data type. Queue operation, Queue linked list design, queuing theory, and Queue Applications Queue linked list implementation

Unit 6: Trees: Basic Tree concepts, Binary trees, Binary tree traversal, Expression tree, general trees, Huffman code, Binary search trees, AVL tree, AVL tree implementation, m-way trees

Unit 7: Graphs: Basic Graph Concept, Graph representation, BFS, DFS, Spanning Trees, Prim's and Kruskal's Algorithms, Dijkstra's Algorithms. Transitive Closure :Warshall's Algorithm

Unit 8: Heaps: Heap Definition, Heap structure, Basic Heap algorithms, Heap data structure, Heap Algorithms, Heap Applications,

Unit 9: Multiway Tree: m-way search tree, B Tree, Simplified B tree, B Tree variations, Lexical search tree.

Unit 10: Advanced sorting concepts: General sort concepts, Insertion sorts, selection sorts, exchange sorts, Heap sort, quick sort, merge sort

Text Book:

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

Reference Book:

Horowitz, Sahani, Fundamentals of Data structure, CBS, New Delhi. Connnet 211. Introduction to Algorithms, PHI.

P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 1ST SEMESTER

Subject Code-MITCC 103 (PR) Subject Name- Lab on SQL AND on Data Structure
Practical-05)

(Credits:

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be veryshort answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory Examinations The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

A. SQL * plus and SQL Commands

- Use of SQL *Plus Buffer Commands, Environment variables and Data Types.
- Use of select, from, where, order by, IN, NOT IN, IS NULL, IS NOT NULL, LIKE, % or _, ALL, ANY, SOME, EXISTS, BETWEEN.
- Computations done on table data-Arithmetic, Relational, Logical, Range, Pattern matching operations.
- **Oracle Functions**-Group function, Scalar Functions, Aggregate function, Date conversion functions, Date functions, String Functions.
- **Grouping data from tables**-GROUP BY clause, HAVING Clause, Grouping by ROLLUP, CUBE operator.
- Use of AND, OR, NOT, UNION, UNION ALL, INTERSECT, MINUS in SQL.
- **Subqueries:** Subqueries in FROM Clause, Correlated subqueries, Multi Column subqueries, Using EXIST/NOT EXIST Operator.
- **Joins:** Joining multiple tables(Equi Join), Inner Join, Outer Join, Concatenating data from table Column.
- **Indexes:** Duplicate/Unique Index, Creation of an Index, Composite Index, Function based Index, Key Compressed Index, Dropping Indexes.

- **Views:** Creating View, Updateable Views, Views Defined from multiple tables, destroying a VIEW.
- **Clusters:** CLUSTER INDEXES, When to CLUSTER, Types of Clusters.
- **Sequence:** Creating a sequences, Referencing a sequence, Altering a sequence, Dropping a sequence.
- Security Management using SQL: Granting and Revoking Permission, Revoking Privileges given.
- **OOPS in Oracle:** Object Types, Feature of Objects, Implementing Object View, Nested tables, Variable Arrays, Referencing Objects.
- Use of COMMIT, ROLLBACK, SAVEPOINT.
- Writing PL/SQL blocks

B. Data Structure Programming:

- Using static/dynamic array sort in ascending and descending order:
(Apply bubble sort, selection sort, insertion sort & quick sort algorithms, heap sort, exchange sort).
- Searching for an element in an array using linear search and binary search.
- Input sparse matrix and store in 3- tuple scheme.
- Input 3-tuple data and convert it to standard matrix.
- Compute transitive closure of an adjacency matrix.
- Implement singly, doubly and circularly linked list using recursive functions.
- **Linked list-** Creation of new node, Insertion of node into single linked list , doubly and circular, deletion of node from single, doubly and circular. Counting no. of nodes in linked list, Printing linked list.
- Implement STACK, QUEUE and DEQUEUE using a vector (1-D array)
- Implement STACK & QUEUE using Linked List.
- **Stacks-** Checking underflow and underflow in stack, Operation of stack-insertion and deletion of an item, Peep and update operation, Applications of stacks- Postfix, prefix.
- Searching for an element in a singly, doubly and circularly linked list.
- **Queue-** Overflow, empty checking, insert and delete operation in single queue, circular queue, dequeue. Programs on Priority queue.
- Write 'C' code to implement and manipulate a Binary Search Tree, Binary Tree, AVL trees
- General Programming using C.
- **Programming through Recursion:** Indirect Recursion, Nested Recursion, Excessive Recursion, Stack overheads in recursion, Removal of recursion, Tower of Hanoi.
- **Heap-** basic heap operation, heap Structure

P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 2nd SEMESTER

Subject Code-MIT-CC204 Subject Name- Operating System (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be veryshort answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Unit 1: Overview of Operating System: OS and the computer system, efficiency, system performance and user convenience, classes of OS's, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time OS, Distributed OS, Modern OS.

Unit 2: Process and Threads: Process and Programs, Programming View of Process, OS View of Process, Threads, Case studies of Process and Threads. Process synchronization and critical section

Unit 3: Scheduling: Preliminaries, Non-preemptive Scheduling Policies, Preemptive Scheduling Policies, scheduling in Practice, Real Time Scheduling, scheduling in LINUX, Scheduling in Windows.

Unit 4: Memory Management: Managing the Memory, Hierarchy, Static and Dynamic Memory Allocation, Memory allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A review of Relocation, Linking and Program.

Unit 5: Virtual Memory: Virtual Memory Basics, Demand Paging, Page Replacement Policies, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Linux Virtual Memory, Virtual Memory using Segmentation.

Unit 6: Deadlocks: Definition of Deadlocks, Deadlocks In Resources Allocation, Handling Deadlocks, Deadlocks and Resolution, Deadlocks Prevention, Deadlock avoidance.

Unit 7: 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, Protection, Linux Security.

Text book:

1. D.M .Dhamdhare - 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.

2. H. M. Deitel- Operating Systems, 2nd edition Pearson Education 2003.
3. Charles Crowley- Operating Systems - A Design Oriented Approach, TMH
4. AS. Tanenbaun- Operating System: Design and Implementation, PHI, New Delhi, 2002

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 2nd SEMESTER**

Subject Code-MITCC 205 Subject Name – Java Programming (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be two groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be two groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Unit I- Fundamentals of Java programming:Introduction to Object Oriented Programming Language, Difference with C and C++. Introduction to Java, Basic features of Java, Java Architecture, JDK Tools, Java standard Library (JSL), Keywords, Identifiers Data Types, Operators, Precedence Summary, Punctuation Symbols Unicode Characters. Condition and looping control statements for, for each, break continue

Unit II- Class and Object: Declaring a Class, Creating an Object, Methods, Exploring New Operator, constructor its types, Finalizes, this Keyword, Access Specifies, Recursion, Inheritance, Polymorphism, Overriding Methods, Runtime Polymorphism, Implementing Abstract classes, packages and interfaces.

Unit III- Strings and Arrays: Concatenation and Changing Case, Sub strings Data Conversion String Buffer, Types of Array, Array of Objects, Wrapper Class, Vector Class,

Unit IV- Exception Handling:Syntax for Exception Handling Mechanism, User Defined Exceptions

Unit V Threads: Introduction to Threads, Multi - tasking and Multi – threading and synchronization

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.

Unit V – Advance JAVA: Introduction of web application and execution method, Introduction to Servlet JSP, MVC architecture, Designing a View Component, Designing a Model Component, Designing a Controller Component, Web container behavior, Dispatch from a controller servlet to a view servlet, Deploy a web application, Describe the purpose of Session management, Cookies implementation of session management, URL-rewriting, Filter API, Filter class, Configure a filter in deployment descriptor file.

Unit VI – Java Data Base Connectivity: Data Base Connectivity: ODBC API, JDBC Application Architecture, Java. SQL, Obtaining a connection, step connecting Object, Working with Result, statement, Set Meta Data Interface, Design a web application to integrate with a DBMS, Configure a DataSource and JNDI API, JSP technology, Scripting elements, Page directive, Standard tags, Describe and implement expression language (EL)

Unit VII – Introduction to EJB: The Features of Enterprise Javabeans ,Various Components of EJB Architecture, Roles and Responsibilities Provided by EJB Specification, Different Types of Enterprise Javabeans, Components of Enterprise Javabeans, Create and Deploy Stateless Session Beans, Create Applications Using Stateless Session Beans.

Text Book:

1. Herbert Schildt- Java: The Complete Reference, Seventh Edition, McGrawHill, 2006.
2. Java Programming, Sachin Malhotra, Oxford Publication.

Reference:

1. Object Oriented Analysis and Design, G. Booch
2. Object Oriented Modeling and Design using UML”, J. Rumbaugh.
3. Programming with Java, E. Balagurusamy, TMH.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 2nd SEMESTER**

Subject Code-MIT EC201 Subject Name- Software Engineering (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory Examinations The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Unit 1: Introduction to Software Engineering: Evolving Role of Software, Changing Nature of Software, Legacy software, Software Engineering - A Layered Technology.

Unit 2 : 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 3: Requirement Engineering: Requirement Engineering Task, Eliciting Requirements, Developing Use case, Building the Requirement Model, Negotiating Requirements, Validating Requirements.

Unit 4: Design Engineering: Design process and Design Quality, Design concepts, Design Models.

Unit 5: Testing 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 6: 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 7: 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 6th Edition, McGraw Hill.

Reference Book:

1. Ian Sommerville - Software Engineering, 7th Edition, Pearson Education.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 2nd SEMESTER**

Subject Code-MIT CC 206(PR) Subject Name- Lab on Java and Linux(Credits: Practical-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be two groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be two groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

A. JAVA Programming

- Programming in Java using control structure, Array, String, Class and Object, Constructor and finalizer, inheritance, interface.
- Programming in java using multithreading-setting priorities, suspending and restarting thread.
- Exception handling-try, catch, throw, finally.
- Applet programs using Applet class, Applet structure, paint(), update(), repaint(), image handling, Graphics class.
- AWT class related program- Button, Check box, list boxes, container class-Panels, Window, Frame.
- Programming in swing-JFrame, JApplet, JList.
- Database handling using JDBC-Loading driver, Establishing Connection, Execute Query.
- Servlet- HTML files for sending from Data to Server.
- Socket Programming- TCP client and Server, UDP Client and Server.

B. UNIX/LINUX Shell Commands and Shell Programming:

- **Linux shell Commands** : ls, cat, wc, grep, chmod, directory related commands, date, man, cp, mv, cmp, chown, chgrp, touch, dd, expand, nl, tac, tail, head, ps, kill, nohup, at, batch, write, mail, wall, date, who, who am I, man, cal, lpr, tee, script, tput, split, expr, bc.
- **Pipes and filter commands**: pipe, redirection, filter, sort, grep, uniq, more, pr, cut, paste, tr, sed, gawk.
- **Vi editors**: starting vi editor, vi modes, insert commands, delete commands, replace commands, cursor movement commands, search commands, yanking commands, redo and undo commands, screen commands, ex mode commands.
- **Shell programming**: shell variable: echo and export, conditional parameter substitution, Escape mechanism, positional parameters: shift, set, read, exit, shell meta characters, control statements: if statement, test command, case statement, looping: while, until, for, break, continue, Infinite loop, Shell functions, sleep, basename.
- **Shell programs based on control structure.**

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 3rd SEMESTER**

Subject Code-MIT EC 302 Subject Name- Programming with Python**(Credits: Theory-05)****Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45*****Instruction to Question Setter for******Mid Semester Examination (MSE):***

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Unit1: Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals

Unit2: Introduction to programming in Python: variables and built-in types (strings, lists, tuples, dictionaries, sets), Operators in python, Input and Output Statements, multi-dimensional lists

Unit 3: Control statements: Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass

Unit 4: Functions: Defining Functions, default arguments

Unit 5: Classes and Objects: defining classes, constructor, destructor, inheritance, super() function and MRO overriding methods, Special/magic methods and operator overloading

Unit 6: File Handling: file object, opening and closing files, reading and writing to text files, csv values and binary files

Unit 7 GUI Interface with Python: creating interactive screen with python, plotting graphs and charts

Unit 8 Data Connectivity with Python: making connection and executing queries with python

Unit 9 Modules: creating modules and packages, import statement, some built-in modules (Arrays, statistics, math, OS)

Reference Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.org 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
4. <http://docs.python.org/3/tutorial/index.html>
5. <http://interactivepython.org/courselib/static/pythonds>

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 3rd SEMESTER**

Subject Code-MITCC-307 Subject Name – Formal Language and Automata Theory (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be veryshort answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd., 5 marks).

Unit 1: Basic Mathematical Object and Mathematical Induction: Sets, logic, Functions, Relations, Operations on Relations, Alphabets, Strings, Language, Principle of Mathematical induction, Recursive definition.

Unit 2: Regular Expressions and Finite Automata: Regular languages and Regular Expressions, Memory required to recognize a language, finite Automata, capability & limitations of FSM, Deterministic Finite Automata, Non-Deterministic Finite Automata, NFA with e-moves, regular sets & regular expressions, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c, two way finite automata equivalence with one way, Kleen's Theorem, applications of finite automata.

Unit 3: Regular and Non regular languages: Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages, Decision problems, Regular Language and Computers.

Unit 4: Context Free Grammars: Introduction, definition, Regular Grammar, Derivation trees, Ambiguity, Simplified forms and Normal Forms, Applications.

Unit 5: 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, Interaction and Complements of CFL, Decision algorithms.

Unit 6: 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 7: Recursively Enumerable Languages: Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomsky Hierarchy, Non-recursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem, Computational Complexity: Discussion on P, NP, NPC and NP-Hard Problems.

Text Books:

1. John Martin- Introduction to languages and the Theory of Computation, 3rd ed, TMH.

Reference Books:

1. K.L.P. Mishra & N. Chandrasekharan- Theory of Computer Science, PHI
2. Hopcroft JE. And Ullman JD- Introduction of Automata Theory, Languages & Computations, Narosa.
3. Lewis H.R. and Papadimitrou C.H., Elements of the theory of Computation, PHI.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 3rd SEMESTER**

Subject Code-MITCC 308 Subject Name – Data Communication and Networking (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd., 5 marks).

Unit 1: Basics of Data Communication: Communication system, Structure of Communication Network: Point-to-Point, Multipoint, data flow, Analog and Digital Communication, Data communication modes, Synchronous and Asynchronous Transmission, Simplex, Half-duplex and Full duplex communication, Networking Protocols and Standards, Layered approach.

Unit 2: OSI and TCP/IP Reference Models: OSI Model, Need, Basic functions of each layer, TCP/IP, Comparisons with TCP/IP layers.

Unit 3: Modulation, Encoding and Multiplexing: Analog Modulation: AM, FM, PM., Data Encoding: Digital Data Digital Signals: NRZ-L, NRZ-I, Manchester, Differential Manchester, Digital Data Analog Signals: ASK, FSK, PSK, **Analog Data Digital Signals:** PCM, DM, Introduction to FDM, TDM, SDM.

Unit 4 : Communication Mediums: Digital data transmission, Transmission Impairment, Serial and Parallel Transmission, Guided and Unguided mediums, Wireless Communication, Coaxial Cables, Twisted Pair Cables, Fiber Optic Cables, Connectors

Unit 5: Motivation for Networking and Network Classification : Motivation for Networking, Classification of Networks based on Technology, Scale, Topology and Ownership, LAN overview, LAN Topologies, LAN access methods, ALOHA, Token Passing, Polling, Ethernet, Bluetooth.

Unit 6 : Physical and Data link Layer : ARQ, Piggybacking, CRC, Framing, Retransmission strategies, Random access (CSMA, CSMA/CD, CSMA/CA).

Unit 7 : Internetworking Devices & Network layer: Network Interface Cards, Modems, Repeaters, Hubs, Bridges, Switches and gateways; Circuit, Message and Packet Switching, X.25 WAN, Routing, Congestion control, IPv4: Classful and Classless, IPv6 addresses.

Unit 8 : Transport layer and Application Layer : Addressing, Multiplexing, Flow control, Port numbers, DNS, Remote Logging, FTP, Net work Management, Client-Server Applications, WWW, E-mail.

Unit 9 : Network Security : Introduction to computer security, Authentication and Privacy, Public and Private key Cryptography, Digital Signature

Text Book:

1. "Data Communication and Networking", B.A. Forouzan. Tata Mcgraw Hill.

References:

1. "Computer Communication Networks", Stallings.
2. "Computer Networks- Protocols, Standards and Interfaces", Black, U. Pretice Hall of India.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 3rd SEMESTER**

**Subject Code-MIT CC309 Subject Name- Programming with Python Lab
(Credits: Practical -05)**

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

1. Programs with lists, tuples and dictionaries
2. Program performing various set operations
3. Programs with different matrix operations
4. Programs with control statements
5. Programs with functions and default parameters
6. Programs with classes, inheritance and operator overloading
7. Programs with text and binary files
8. Programs with GUI
9. Application with database connectivity
10. Programs with modules

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 4th SEMESTER**

Subject Code-MIT EC 403 Subject Name – Elective I (Artificial Intelligence)
(Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Unit 1: Introduction: Overview of Artificial Intelligence- -Problems of AI Technique, Tic -Tac-Toe Problem.

Unit 2: Problem Solving: Problems, Problem Space & Search: Defining The Problem As StateSpace Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

Unit 3: Search Techniques: Solving Problems By Searching: Problem Solving Agents, Searching For Solutions, Uniform Search strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies. **Heuristic Search Strategies:** Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms; Constraint Satisfaction Problems, Local Search For Constraint Satisfaction Problems.

Unit 4: Adversarial Search: Games, Optimal Decisions & Strategies In Games, The Minimax Search Procedure, Alpha-Beta Pruning, Additional Refinements, Iterative Deepening. **Knowledge & Reasoning:** Knowledge Representation Issues, Representation & Mapping, Approaches To Knowledge Representation, Issues In Knowledge Representation.

Unit 5: Using Predicate Logic: Representing Simple Fact In Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, Natural Deduction. Representing

Knowledge Using Rules: Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

Unit 6: Probabilistic Reasoning:Representing Knowledge In An Uncertain Domain, The Semantics of Bayesian Networks, Dempster- s-hafer Theory, Fuzzy Sets & Fuzzy Logics. Planning: Overview, Components of A Planning System, Goal Stack Planning, Hierarchical Planning, Other Planning Techniques.

Unit 7: Learning: Forms of Learning, Inductive Learning, Learning Decision Trees, Explanation Based Learning, Learning Using Relevance Information, neural Net Learning & Genetic Learning.
ExpertSystems: Representing And Using Domain Knowledge, Expert System Shells, Knowledge Acquisition.

Text Book:

1. Rich & Knight-Artificial Intelligence, TMH

Reference Books:

1. S. Russell and P. Norvig- Artificial Intelligence A Modern Approach, Publication.
- DAW W. Patterson- Introduction to Artificial Intelligence & Expert Systems.Pearson Publication.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 4th SEMESTER**

Subject Code-MIT CC410 Subject Name – IPR with Business Communication and Management

(Credits: Theory - 05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be veryshort answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: *There may be subdivisions in each question asked in Theory ExaminationsThe Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.*

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd., 5 marks).

Unit 1: Intellectual Property Rights (IPR): Introduction – Definition & Scope of Intellectual Property Right (IPR), **Types of IPR:** Copyright, Patent, Trademark, Design, Geographical indication, **Copyright:** Concept of copyright as a protection under the IPR, The idea and expression Dichotomy, Copyright in Original and Derivative Works, Moral Rights, Concept of Ownership, Authorship and Joint Authorship of Copyright, Assignment, License and Registration, Types of plagiarism & tools to check plagiarism

Unit 2: Emerging Issues and Management of IPR: IPR relationship with software and technology, Challenges for IP in digital economy, e- commerce.

Unit 3: Principle of Management: Role of manager, leadership, motivation, teams

Unit 4: Business Communication-Effective Business Communication- Definition, Features, Characteristics and Benefits, Process of Communication, Functions of Communication, Communication Networks, Communication Barriers.

Unit 5: Verbal and Non-Verbal communication: Definition and their difference, Forms of Non-Verbal Communication, Types of Non-Verbal Communication.

Unit 6: Business Writing- importance of written communication, types of business messages, Email writing

Unit 7: Business Report- Kinds of reports, characteristic of report, purpose of report, steps in writing report, parts of reports, business proposal

Unit 8: Resume, Biodata and CV- Format and Examples,

Unit 9: Job Applications and Interview Techniques-Fundamentals, Types of Interviews, Types of Interview questions, Examples.

Text Book:

1. Meenakshi Raman & Prakash Singh-Business Communication. Oxford Publication.

Reference Book

1. Business communication-Making Connections in a Digital World. Lesikar, Flatley, Rentz, Pande- Eleventh Edition- Special Indian Edition.
2. R., and Panton, F. "The Essence of Effective Communication". Prentice Hall of India Pvt. Ltd.
3. Munter, M. "Business Communication: Strategy and Skill". Prentice Hall of India Pvt. Ltd.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 4th SEMESTER**

Subject Code-MIT EC 404 Subject Name – Discrete Structure with Optimization Technique (Credits: Theory-05)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: Hrs)=100 Pass Marks (SIA:17 + ESE:28)=45

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations. The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "Best of Two" system will be applicable for marking for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Unit 1: Operation Research – An overview, Organ and Development of OR, Nature and Features of OR, Modeling in OR, General Solution Methods for OR models, Scientific method in OR, Methodology of OR, Application, Opportunities and Shortcomings of OR.

Unit 2: Linear Programming Problem :Introduction, Mathematical Formulation of the Problem, Graphical Solution Method, Some Exceptional Cases, General LPP, Canonical and Standard forms of LPP, Simplex Method: Introduction, Fundamental properties of solutions, the Computational Procedure, Use of Artificial variables, Solution to simulation Linear Equations, Inverting a Matrix using Simplex Method.

Unit 3: Duality in LPP: Introduction, General Primal – Dual pair, formulating a Dual Problem, Primal Dual pair in Matrix form, Duality theorems, Dual simplex method, Post optimal Analysis, Introduction: Variation in cost vector, Requirement Vector, Coefficient Matrix, Structural Variation.

Unit 4: Integer Programming and Advance LPP techniques: Introduction, Gomory's Method, Construction of Gomory's constraints, Fractional Cut Method: All Integer & Mixed Integer, Revised Simplex Method, Bounded Variable, Parametric LPP, Karmarkar Algorithm.

Unit 5: Dynamic Programming & Introduction: Characteristic of Dynamic Programming, Dynamic Programming Algorithm, Solution of LPP by Dynamic Programming.

Unit 6: Introduction: Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

Unit 7: Graph Theory:

Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

Text Book:

1. Kanti Swarup, P.K. Gupta, Man Mohan – “Operations Research”, Sultan Chand & Sons, New Delhi – 2001

Reference Books:

1. Ronald L. Rardin “Optimization in Operations Research”, Pearson Education, New Delhi – 2003
2. S.S. Rao, “Optimization Theory & Application”, Wiley Eastern Ltd, 1979

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI
M.Sc. (IT) 4th SEMESTER**

Subject Code-Project Subject Name – Dissertation /Project(Credits: Theory-05)

Total Marks=60(Project)+20(OnJob Training)+20(Seminar)

Pass Marks=45

A. Final Project (60 Marks)

***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*

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

- Website Development
- Software development through programming languages like C, C++, Java, C#, VB.net
- Games /Animations
- Android based app
- Robotics
- Research Based Project
- Website development using HTML, PHP, CSS, ASP.net.
- Dreamweaver: Website development through Dreamweaver, inserting images, bullet and numbering, database connectivity.

Academic Credits for training shall be based on following:

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

B. ON JOB TRAINING (20 Marks)

- OJT is **ON JOB TRAINING**; Student have to do two months (**OJT Two 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.
- 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 20 marks.

C. Seminar (20 Marks)

A research paper or review on given topic with PowerPoint Presentation has to be present for award of marks.

**P.G. DEPARTMENT OF INFORMATION TECHNOLOGY
RANCHI WOMEN'S COLLEGE, RANCHI**

**ELIGIBILITY CRITERIA FOR ADMISSION
M. Sc. IT**

1. Candidate must Mathematics as one of the subjects at class 10 and passed with 50% marks
2. Candidate must have passed graduation or equivalent with 50% marks in any of following subjects
 - a. Information Technology
 - b. Computer Application
 - c. Computer Science
 - d. Computer Maintenance
 - e. Electronics
 - f. Mathematics
 - g. Physics

*Candidates appearing in final exam may apply, however their admission will be confirmed only after fulfillment of the criteria