BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

THIRD SEMESTER

Sl. No.	Paper Code	Paper Title	L	P	Credits	Course Category
THEORY PAPERS						
1	BCS 201	Discrete Mathematics	4	-	4	DC
2	BIT 203	Database Management Systems	4	-	4	DC
3	BCS 207	Data Structure	4	-	4	DC
4	BIT 209	Object Oriented Programming	4	-	4	DC
5	BEC 211	Analog & Digital Electronics	4	-	4	ES
PRACTICAL/VIVA VOCE						
1	BIT 253	Database Management Systems Lab	0	2	1	DC
2	BCS 257	Data Structure Lab	0	4	2	DC
3	BIT 259	Object Oriented Programming using C++ and JAVA Lab	0	2	1	DC
4	BEC 261	Analog & Digital Electronics Lab	0	2	1	ES
		TOTAL	**20**	**10**	**25**	

FOURTH SEMESTER

Sl. No.	Paper Code	Paper Title	L	P	Credits	Course Category
THEORY PAPERS						
1	BAS 202	Advanced Engineering Mathematics	4	-	4	ES
2	BCS 204	Computer Organization & Architecture	4	-	4	DC
3	BCS 206	Analysis & Design of Algorithms	4	-	4	DC
4	BIT 208	Operating System	4	-	4	DC
5	BIT 210	Object Oriented Software Engineering	4	-	4	DC
PRACTICAL/VIVA VOCE						
1	BCS 254	Computer Organization & Architecture Lab	0	2	1	DC
2	BCS 256	Analysis & Design of Algorithms Lab	0	4	2	DC
3	BIT 258	Operating System Lab (using LINUX as Case Study)	0	2	1	DC
4	BIT 260	Object Oriented Software Engineering Lab	0	2	1	DC
		TOTAL	**20**	**10**	**25**	

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed
FIFTH SEMESTER

Sl. No.	Paper Code	Paper Title	L	P	Credits	Course Category
THEORY PAPERS						
1	BCS 301	Theory of Computation	4	-	4	DC
2	BIT 303	Computer Graphics & Multimedia	4	-	4	DC
3	BIT 305	Requirement & Estimation Techniques	4	-	4	DC
4	BIT 307	Data Communication & Computer Networks	4	-	4	DC
5	BIT 309	Data Warehousing & Data Mining	4	-	4	DC
6	BAS 311	Human Values & Professional Ethics	3	-	3	HS
PRACTICAL/VIVA VOCE						
1	BIT 353	Computer Graphics & Multimedia Lab	0	4	2	DC
2	BIT 355	Requirement & Estimation Techniques Lab	0	2	1	DC
3	BIT 357	Data Communication & Computer Networks Lab	0	2	1	DC
4	BIT 359	Data Warehousing & Data Mining Lab	0	2	1	DC
		TOTAL	**23**	**10**	**28**	

SIXTH SEMESTER

Sl. No.	Paper Code	Paper Title	L	P	Credits	Course Category
THEORY PAPERS						
1	BIT 302	Web & Mobile Technologies	4	-	4	DC
2	BCS 304	Compiler Design	4	-	4	DC
3	BCS 306	Network Programming	4	-	4	DC
4	BCS 308	Cloud Computing	4	-	4	DC
5	BIT 310	Artificial Intelligence	4	-	4	DC
6	BAS 312	Engineering Economics	3	-	3	HS
PRACTICAL/VIVA VOCE						
1	BIT 352	Web & Mobile Technologies Lab	0	2	1	DC
2	BCS 354	Compiler Design Lab	0	2	1	DC
3	BCS 356	Network Programming Lab	0	2	1	DC
4	BCS 358	Cloud Computing Lab	0	2	1	DC
5	BIT 360	Artificial Intelligence Lab	0	2	1	DC
		TOTAL	**23**	**10**	**28**	

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

NOTE: - 4-6 weeks training will be held after sixth semester. However, Viva-Voce will be conducted in the seventh semester.

NOTES:

1. **Total number of the credits of the B.Tech. Programme = 212**

2. **Each student shall be required to appear for examinations in all courses. However, for the Award of the degree a student shall be required to earn the minimum of 204 credits without excluding the core exams.**

Course Category wise Credit Distribution Table

Semester	BS	ES	HS	DC	DE	Total
03	-	5	-	20	-	25
04	4	-	-	21	-	25
05	-	-	3	25	-	28
06	-	-	3	25	-	28
07	-	-	3	16	4	23
08	-	-	3	16	4	23
Total	4	5	12	123	8	153

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BCS 201	**L**	**P**	**C**
Paper Title: Discrete Mathematics	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks.**

Unit-I

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs, Proofs of some general identities on sets. **Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations. **Functions:** Definition, Classification of functions, Operations on functions, Recursively defined functions. Growth of Functions. **Natural Numbers:** Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases, Proof Methods, Proof by counter – example, Proof by contradiction.

[10 Hrs]

Unit-II

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields, Integers Modulo n.
Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram. **Lattices:** Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. **[10 Hrs]**

Unit-III

Binary Logic : Proposition, well formed formula, Truth tables, Tautology,Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. **Predicate Logic:** First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic. **Multivalued Logic:** Fuzzy Logic, Introduction to fuzzy sets, Operations on fuzzy sets.

[10 Hrs]

Unit-IV

Trees: Definition, Binary tree, Binary tree traversal, Binary search tree. **Graphs:** Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring. **Recurrence Relation & Generating function:** Recursive definition of functions, Recursive algorithms, Method of solving recurrences. **Combinatorics:** Introduction, Counting Techniques, Pigeonhole Principle, Countability, Dovetailling.

[10 Hrs]

TEXT BOOKS:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", 6/e, McGraw-Hill, 2006.
2. B. Kolman, R.C. Busby, and S.C. Ross, "Discrete Mathematical Structures", 5/e, Prentice Hall, 2004.
3. C.L. Liu, "Elements of Discrete Mathematics", TMH, 2000.

REFERENCE BOOKS:

1. Koshy, "Discrete Structures", Elsevier Pub. 2008.
2. E.R. Scheinerman, "Mathematics: A Discrete Introduction", Brooks/Cole,2000.
3. R.P. Grimaldi, "Discrete and Combinatorial Mathematics", 5/e, Addison Wesley, 2004.
4. Jean Paul Trembley, R Manohar, "Discrete Mathematical Structures with Application to Computer Science", McGraw-Hill, Inc. New York, NY, 1975.
5. John Yen & Reza Langari ,"Fuzzy logic intelligence control and information", Prentice Hall, 1999.

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

	L	P	C
Paper Code: BIT 203			
Paper Title: Database Management Systems	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Max. Marks: 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT – I

Overview of Concepts and Conceptual Database Design: Database administrator & Database Users, Characteristics of the Database, Database Systems, Concepts and Architecture, Data Models, Schemes & Instances, DBMS Architecture & Data Independence, Database Languages & Interfaces, Overview of Hierarchical, Network & Relational Data Base Management Systems, Data Modeling Using The Entity-Relationship Model – Entities, Attributes and Relationships, Cardinality of Relationships, Strong and Weak Entity Sets, Generalization, Specialization, and Aggregation. **[10 Hrs]**

UNIT – II

Relational Model, Languages & Systems: Relational Model Concepts, Relational Model Constraints, Translating your ER Model into Relational Model, Relational Algebra, Relational Calculus (tuple calculus)

SQL: A Relational Database Language, Data Definition in SQL, View and Queries in SQL, Specifying Constraints and Indexes in SQL, Practicing SQL commands using ORACLE **[10 Hrs]**

UNIT – III

Relational Data Base Design: Functional Dependencies & Normalization for Relational Databases, Functional Dependencies, Normal Forms (1NF, 2NF, 3NF , BCNF,4NF,5NF), Lossless Join and Dependency Preserving Decomposition, Multivalued Dependency, Join dependency.

Transaction Management: Transaction Concept and State, Implementation of Atomicity and Durability, Serializability, Recoverability, Implementation of Isolation **[10 Hrs]**

UNIT – IV

Concurrency Control: Lock-Based Protocols, Timestamp-based Protocols, Deadlock Handling, Recovery System, Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery.

Query Processing: Query Processing Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions.

Framework of Distributed Data Base Management Systems, **Introduction to Enhanced Databases:** Multimedia Databases, Object Oriented Databases, Mobile Databases and Case study on various commercially available DBMS. **[10 Hrs]**

TEXT BOOKS:

1. Korth, Silberschatz, "Database System Concepts", 6th Ed., TMH, 2010.
2. Elmsari and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson, 2013.
3. C. J. Date and Kannan, "An Introduction to Database Systems", 8th Ed., Pearson, 2006.

REFERENCE BOOKS:

1. Ceri and Pelagatti , Distributed Databases : Principles & Systems, McGraw-Hill Computer Science Series, 2008.
2. J. D. Ullman, "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.
3. Conolly & Begg, " Database Management Systems, 5th Edition, Pearson Education Asia., 2010

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Code No.: BCS 207	**L**	**P**	**C**
Paper: Data Structure	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **MAXIMUM MARKS: 60**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
2. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks.

UNIT–I

Fundamentals of algorithm analysis: Time and space complexity, Elementary data structures and their applications. **Arrays:** ordered lists, representation of arrays, sparse matrices. **Linked List**: singly and doubly linked lists, Circular Linked list **Stacks:** Primitive operations, Application of stacks, multiple stacks. **Queue:** Primitive operations, Application of queues, multiple queues. **[10 Hrs]**

UNIT–II

Recursion: Recursive definition and processes, Factorial function, Fibonacci series, Recursive binary search. **Trees:** Binary Trees; Definition, traversal, threaded binary Tree. **Graphs:** Representation, traversal, connected components, shortest path algorithms, topological sort, Minimum Spanning Tree; Definitions and algorithms. **[10 Hrs]**

UNIT–III

Searching: Sequential Search, Binary Search, Tree Searching, Binary Search Tree, Insertion & Deletion, AVL trees, Multi way search tree, B tree, B^+ Tree. **Hashing:** Hash Function**,** Hash Table, Hashing Techniques. **[10 Hrs]**

UNIT–IV

Sorting: Quick Sort, Merge Sort, Heap Sort and other sorting techniques, K-way Merge Sort. **Files**: Creation and Processing of files, File handling, Reading/ Writing of files, Operations of files, File Organization, Indexing, Error handling. **Storage Management:** Automatic List Management, Reference Count Method, Garbage Collection, Collection and Compaction.

[10 Hrs]

TEXT BOOKS:

1. Y. Langsam et. al., "Data Structures using C and C++", PHI, 1999.
2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI, 2000.

REFERENCES BOOKS:

1. Schaum's outline series, "Data Structure", TMH, 2002
2. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Booksource Pvt. Ltd, 1999.
3. Yashwant Kanetkar, "Data Structure through C", BPB, 2005

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BIT 209	**L**	**P**	**C**
Paper Title: Object Oriented Programming	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Max. Marks: 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT - I

Introduction: Need for Object Oriented Programming, Comparison of Programming paradigms, Characteristics of Object-Oriented Programming Languages, Introduction to Object Oriented concepts (classes, objects, encapsulation, inheritance, data hiding, abstraction, polymorphism), Overview and characteristics of C++ , Fundamentals Data Types & Literals Variables, Arrays, Operators, Control of Flow in OOP, Compilation and Execution Process in C++, Reference vs. Pointer variable.**Classes and Objects:** C++ & Java class declaration, Role of private, public and protected access specifiers, Memory organization of class, inline function, friend function, static members , constructor and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, new and delete operator

[10 Hrs]

UNIT - II

Polymorphism in C++: Function overloading, Constructor overloading, Compile time polymorphism, Overloading Rules, Operator Overloading (Unary and Binary) as member function/friend function.

Inheritance in C++: Inheritance, Types of Inheritance, Use of protected access specifier, Virtual base class, Ambiguity resolution using scope resolution operator and Virtual base class, Overriding inheritance methods, Constructors and Destructor in derived classes. Runtime polymorphism, Pointer to objects, Virtual Functions (concept of virtual table), pure virtual functions, Abstract Class.

[10 hrs]

UNIT - III

Managing Input / Output in C++: Concept of streams, console I/O – formatted and unformatted, Manipulators, File I/O – Predefined classes, file opening & closing, file manipulation, read & write operations, sequential and random file access.

Exception Handling in C++: Basic mechanism, Throwing, Catching and Re-throwing.

Namespace: Basic concept, role of scope resolution operator and using keyword.

[10Hrs]

UNIT - IV

Introduction to Java- Overview and characteristics of Java, Data types, Organization of the Java Virtual Machine, Compilation and Execution Process in java, Classes: String and String Buffer classes, Wrapper classes, using super keyword, Multilevel hierarchy abstract and final

classes, Object class, Packages and interfaces, Access protection, Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throws, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

[10Hrs]

TEXT BOOKS:

1. E. Balaguruswamy, "Object Oriented Programming with C++", 4th Edition, TMH, 2011.
2. Bjarne Stroustrup , "The C++ Programming Language", Pearson, 3rd Edition, 200.
3. Patrick Naughton and Herbertz Schildt , "Java-2: The Complete Reference", TMH, 1999.

REFERENCE BOOKS:

1. Schildt Herbert, "C++: The Complete Reference", Tata McGraw Hill, 4th Ed., 1999.
2. R. Nageswara Rao/kogent Solutions," Core Java: An Integrated Approach: Covers Concepts, programs and Interview Questions", 2008.
3. Pandey, "JAVA Programming", Pearson, 2012.

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BCS 204	**L**	**P**	**C**
Paper Title: Computer Organization and Architecture	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.**

UNIT-I

Basic functional blocks of a computer and its Representation: Functional units, Basic operational concepts, Bus structures, Performance and metrics, Instructions and instruction sequencing, Hardware–Software Interface, Instruction set architecture, Addressing modes, RISC, CISC, ALU design, Fixed point and floating point operations, Case study of a CPU (Intel Atom Board). **[10 Hrs.]**

UNIT-II

CPU Control Unit Design: Execution of a complete instruction, Multiple bus organization, Hardwired control, Micro programmed control, Computer arithmetic, Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry savemultiplier etc. **Pipeline-** Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Performance considerations, Exception handling. Case Study of Intel Atom Board. **[10 Hrs.]**

UNIT-III

Memory system design: Basic concepts, Semiconductor RAM – ROM, Speed, Size and cost, Cache memories, Improving cache performance, Virtual memory, Memory management requirements, Associative memories, Secondary storage devices. Case study of Intel Atom Board. **[10 Hrs.]**

UNIT-IV

I/O Organization: Accessing I/O devices, Programmed Input/Output, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors. **[10 Hrs.]**

TEXT BOOKS:

1. John P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.
2. William Stallings, "Computer Organization and Architecture: Designing for Performance", Pearson Education, 2010.
3. M.Morris Mano, "Computer System Architecture", PHI, 2nd Edition.

REFERENCE BOOKS:

1. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Elsevier, 2012.
2. Carl Hamachar, Zvonco Vranesic and Safwat Zaky, "Computer Organization", McGraw Hill, 1990.
3. Vincent P. Heuring and Harry F. Jordan, "Computer Systems Design and Architecture", Pearson Education, 2nd Edition, 1996.

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BCS 206	**L**	**P**	**C**
Paper Title: Analysis & Design of Algorithms	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.**

UNIT–I

Preliminaries: Review of growth of function, Recurrences: Substitution method, Iteration method, Master method. **Divide and Conquer Approach:** Merge Sort, Quick sort, Simultaneous Max and Min Problem, Strassen's algorithm for Matrix Multiplications. **[10 Hrs.]**

UNIT–II

Greedy Algorithms: Elements of Greedy strategy, knapsack problem, job sequencing with deadlines, minimum spanning trees, Activity selection problem, Huffman Codes. **Dynamic Programming:** Elements of Dynamic Programming, Matrix Chain Multiplication, Longest common subsequence and optimal binary search trees problems. **[10 Hrs.]**

UNIT–III

Graph Algorithms: DFS, BFS, Topological Sort, Strongly Connected Components, Kruskal's and Prim's algorithm for MST, Dijkstra's and Bellman Fort Algorithm, All pair shortest paths Algorithm. **Back Tracking:** General method, 8 queen's problem, **Branch and Bound:** General Method, 0/1 knapsack. **[10 Hrs.]**

UNIT–IV

String matching: Naïve String Matching algorithm, Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm. **NP-Complete Problem:** Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems. **[10 Hrs.]**

TEXT BOOKS:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, "Introduction to Algorithms", 2nd Ed., PHI, 2004.
2. Ellis Horowitz and Sartaz Sahani, "Fundamental of Computer Algorithms", Galgotia Publications, 1999.

REFERENCES BOOKS:

1. A. V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addition Wesley, 1998.
2. D. E. Knuth, "The Art of Computer Programming", 2nd Ed., Addison Wesley, 1998
3. Jean Paul Trembley, Richard B.Bunt, "Introduction to Computers Science- An algorithms approach", T.M.H, 2002.

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BIT 208	**L**	**P**	**C**
Paper Title: Operating System	**4**	**0**	**4**

INSTRUCTIONS TO PAPER SETTERS: **Max. Marks: 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT–I

Introduction: What is an Operating System, **Types of O.S:** Simple Batch, Multi-programmed Batched, Time-Sharing, Personal-computer, Parallel, Distributed, Real-Time, Mobile

Operating-System Structures: Layered Architecture, System Calls, System Programs, System Structure, Virtual Machine

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Inter-process Communication, Threads, Multithreaded Programming. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling

[10 Hrs]

UNIT–II

Process Synchronization: Background, Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Atomic Transactions. **Memory Management**: Background, Logical versus Physical Address space, Swapping, Contiguous allocation, Fragmentation, Paging, Segmentation, Segmentation with Paging. Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

[10 Hrs]

UNIT–III

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices

Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability, Stable-Storage Implementation

Information Management: Introduction, Simple File System, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File System

[10 Hrs]

UNIT–IV

File-System Interface: File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File-System Implementation: File-System Structure, Allocation Methods, Free-Space Management, Directory Implementation, Efficiency and Performance, Recovery.

[10 Hrs]

Note: Case Study of Linux & Windows along with O.S concepts to be taught.

TEXT BOOKS:

1. Silbersachatz and Galvin, "Operating System Concepts", Pearson, 8th Ed., 2008.
2. R. C. Joshi, "Operating Systems", Wiley Dreamtech, 2005.

REFERENCES BOOKS:

1. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2006.
2. E. Madnick, J. Donovan, "Operating Systems", Tata McGraw Hill, 2001.

BACHELOR OF TECHNOLOGY (IGDTUW)
(Information Technology)
(Teaching and Examination Scheme) – Proposed

Paper Code: BIT 210
Paper Title: Object Oriented Software Engineering **4** **0** **4**

INSTRUCTIONS TO PAPER SETTERS: **Max. Marks: 60**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks**

UNIT I

Introduction: Software Crisis, Software Processes, **Software Process Life cycle models:** Waterfall Model, Prototyping Model, Iterative Enhancement Model, Evolutionary Development and Spiral Model

Object Oriented Methodology: Object Oriented Concepts, Object Oriented Process and Models

[10 Hrs]

UNIT II

Software Requirements Analysis & Specifications: Requirement Elicitation Concepts, Managing Requirements Elicitation, Software Requirement Specification (SRS) Standards.

Analysis and Modeling: Analysis concepts, Data Flow Diagrams, Analysis Activities, Unified Modeling Language (Use cases, Class Diagram, Interaction diagrams, Activity diagram, object models) Modeling Interactions among Objects.

[10 Hrs]

UNIT III

Software System Design: Design standards, design issues: cohesion and coupling, object oriented design, Detailed class diagram, Reuse Concepts-Solution Objects, Inheritance and Design Patterns, Reuse Activities- Selecting Design Patterns and Components, Managing Reuse

Software Project Planning: Function Point Model, Cost estimation, COCOMO model, Putnam Resource Allocation Model **Software metrics:** Function Count, Data Structure Metrics, Information Flow Metric, and Object oriented metrics.

[10 Hrs]

UNIT IV

Software Testing: Introduction to Functional testing and Structural Testing, Unit testing, integration and system testing, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

[10 Hrs]

TEXT BOOKS:

1. Bruegge and Dutoit, "Object-Oriented Software Engineering- Using UML, Patterns and Java", 3rd Edition, 2010.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", 7th ed., McGraw Hill Int. Ed., 2010.
3. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 3rd Edition, 2007.
4. G. Booch, J Rumbaugh, I Jacobson, "The Unified Modeling Language User Guide" 11th Ed., Pearson Education, 2003.

REFERENCES BOOKS:

1. Timothy C. Lethbridge, Robert Laganiere "Object oriented Software Engineering: Practical Software development using UML and Java" 2nd Ed. McGraw Hill, 2005.
2. Jacobson, "Object-Oriented Software Engineering: A Use Case Driven Approach", Pearson, 1992.