GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE – 641 013

OFFICE OF THE CONTROLLER OF EXAMINATIONS

BRANCH: INFORMATION TECHNOLOGY

CURRICULAM: IV SEMESTER

Sl. No	Course Code	Course Title	Category	Continuous Assessment Marks	End Sem Marks	Total Marks	Credits			
							L	T	P	C
THEORY										
1	16IBS401	Probability, Random processes and Queueing Theory	BS	50	50	100	3	2	0	4
2	16IES402	Elements of Discrete Structures	ES	50	50	100	3	0	0	3
3	16IPC403	Information Coding Techniques	PC	50	50	100	3	0	0	3
4	16IPC404	Database Systems	PC	50	50	100	3	0	0	3
5	16IPC405	Operating Systems	PC	50	50	100	3	0	0	3
6	16IPC406	Analysis and Design of Algorithms	PC	50	50	100	3	0	0	3
PRACTICAL										
7	16IPC407	Database Systems Laboratory	PC	50	50	100	0	0	4	2
8	16IPC408	Operating Systems Laboratory	PC	50	50	100	0	0	4	2
9	16IEE409	Hardware Troubleshooting Techniques	EEC	50	50	100	0	0	4	2
		TOTAL		**450**	**450**	**900**	**18**	**2**	**12**	**25**

CONTROLLER OF EXAMINATIONS

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CONTROLLER OF EXAMINATIONS

16IBS401	PROBABILITY, RANDOM PROCESSES AND QUEUEING THEORY *(Common to EIE, CSE & IT)*	CATEGORY : BS L T P C 3 2 0 4

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* To gain the knowledge of basics of probability.
* To familiarize with standard distributions both discrete and continuous cases and problems of two dimensional distributions.
* To obtain the knowledge of Random process and Markov chains.
* To acquire knowledge of queuing models with finite/infinite capacity in single/ multi servers.

UNIT I : PROBABILITY AND RANDOM VARIABLES	**9+6 Periods**
Axioms of probability-Conditional probability-Total probability-Baye's theorem-Random variables-Discrete and continuous random variables-Moments- Moment generating functions and their properties.	
UNIT II : STANDARD DISTRIBUTIONS	**9+6 Periods**
Binomial ,Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties- Functions of Random variable.	
UNIT III : TWO DIMENSIONAL RANDOM VARIABLES	**9+6 Periods**
Joint distributions-Marginal Distributions-Conditional distributions-Covariance-Correlation and Regression-Transformation of random variables-Central Limit theorem.	
UNIT IV : RANDOM PROCESSES AND MARKOV CHAINS	**9+6 Periods**
Definition and Examples-first and second order, strictly stationary, wide sense stationary and ergodic processes-Markov process-Poisson processes-Birth and Death processes-Markov chains-Transition probabilities-Limiting distributions.	
UNIT V : QUEUEING THEORY	**9+6 Periods**
Markovian models- M/M/1 and M/M/c, finite and infinite capacity, M/G/1 queue (steady state solutions only) Pollazack Khintchine formula-special cases.	
CONTACT PERIODS :	
Lecture: 45 Periods Tutorial: 30 Periods Practical: 0 Periods Total: 75 Periods	

Text Books:

1. *Veerarajan T, "Probability and Random Processes (with Queueing Theory and Queueing Networks)", McGraw Hill Education(India) Pvt Ltd., New Delhi, Fourth Edition 2016.*

Reference Books:

1. *Gupta S.P, "Statistical Methods", Sultan Chand & Sons, New Delhi, 2015.*
2. *Kandasamy, Thilagavathy and Gunavathy, "Probability and Random Process" S. Chand & Co, Ramnagar, New Delhi, Reprint 2013.*
3. *Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 2015.*
4. *Trivedi K.S, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", Prentice Hall of India, New Delhi. 2013.*

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Understand the concepts of probability and random variables. **[Understand]**

CO2: Understand the distributions of discrete and continuous random variables. **[Understand]**

CO3: Understand marginal and conditional probability densities under two dimensional distributions. **[Understand]**

CO4: Understand the first and second order stationary process and probabilities of Markovian processes. **[Understand]**

CO5: Understand queuing models. **[Understand]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	H	M	M						H			M	L
CO2	H	H	M		M					H			M	L
CO3	H	H	M				L			H			M	L
CO4	H	H	H				M			M	M		H	M
CO5	H	H	H	M			M			H	H		H	M
16IBS401	H	H	M	M	L		M			H	M		M	M

L-Low, M-Moderate (Medium) and H-High

16IES402 **ELEMENTS OF DISCRETE STRUCTURES** **CATEGORY: ES**

L	T	P	C
3	0	0	3

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Syntax and semantics of sets, propositional and predicate logic
* Operations on discrete structures such as functions and relations
* Groups, rings and integral domain structures
* Applications of graph theory
* Concepts of Automata Theory

UNIT – I : SETS AND PROPOSITIONS	**(9 Periods)**
Sets-Introduction – Combinations of Sets – Finite and Infinite Sets – Mathematical Induction – Principle of Inclusion and Exclusion –Multisets-Propositions- Logical Connectives – Conditionals and Biconditionals –Well Formed Formulas- Tautologies –Logical Equivalences – Theory of inference for Statement calculus – Predicate Calculus.	
UNIT – II : RELATION AND FUNCTIONS	**(9 Periods)**
Relations-Introduction-A Relational Model for Data Bases-Properties of binary relations-Closure of relations-Warshall's Algorithm-Equivalence relations and Partitions- Partial ordering relations and Lattices-Chains and antichains- Job scheduling problem- Compatible relation	
UNIT – III : GROUPS AND RINGS	**(9 Periods)**
Introduction-Groups-Subgroups-Generators and evaluation of powers-Cosets and Lagrange's Theorem-Permutation groups and Burnside's Theorem-Codes and group codes-Isomorphisms and Automorphisms- Homomorphisms and Normal subgroups-Rings- Integral domains and fields-ring homomorphisms-polynomial rings and cyclic codes	
UNIT – IV : GRAPH THEORY	**(9 Periods)**
Introduction-Basic Terminology-Multigraphs and Weighted graphs-Digraphs and Relations-Representation of graphs-operations on graphs-Paths and Circuits-Graph traversals-shortest paths in weighted graphs-Euclidian paths and circuits-Hamiltonian Paths and Circuits- Traveling Salesperson Problem-Planar Graphs-Graph Coloring	
UNIT – V : MODELLING COMPUTATION	**(9 Periods)**
Introduction – Ordered Sets –Languages- Phrase Structure grammars – Types of Grammars and Languages –Basic Concepts of Information Processing Machine – Finite State Machines –Finite State Machines as Models of Physical Systems – Equivalent Machines – Finite State Machines as Language Recognizers – Finite State Languages and Type-3 Languages – Turing Machine.	
CONTACT PERIODS:	
Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**	

Text Books:

1. *C.L. Liu,D.P. Mohapatra, " Elements of Discrete Mathematics: A Computer Oriented Approach", Tata McGraw Hill, Third Edition (SIE), 2008.*

Reference Books:

1. *Tremblay.J.P and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science ", Tata McGraw Hill Company, 1997, 35 th reprint 2008.*
2. *Kenneth H. Rosen, Rosen "Discrete Mathematics and Its Applications: With Combinatorics and Graph Theory",Tata McGraw Hill, Seventh Edition, 2011.*
3. *SatinderBal Gupta, " Discrete Mathematics and Structures", University Science Press, Fifth edition, 2008*
4. *Seymour Lipschutz and Mark larasLipson, " Discrete Mathematics ",Schaum's outlines, Tata McGraw Hill Company, New Delhi, Third edition, 2010.*

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Verify the correctness of an argument using propositional and predicate logic. **[Analyze]**
CO2: Perform operations on discrete structures such as sets, functions and relations. **[Understand]**
CO3: Apply the concepts of groups and rings in real time applications. **[Understand]**
CO4: Use graph as a powerful modeling tool. **[Understand]**
CO5: Design Turing machine for the given problem **[Analyze]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L	H	M	H	L			M			M		H	L
CO2	M	M	M	H	L			M			M		M	L
CO3	M	M	H	H	L			M			M		H	L
CO4	L	H	M	H	H			M			M		H	L
CO5	M	H	H	M	L			M			M		H	L
16IES402	M	H	M	H	M			M			M		H	L

L-Low, M-Moderate (Medium) and H-High

16IPC403 **INFORMATION CODING TECHNIQUES** **CATEGORY: PC**

L	T	P	C
3	0	0	3

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Information theory and channel capacity.
* Source coding techniques.
* Error control coding techniques like linear block codes, convolution codes.
* Compression and decompression techniques.
* Concepts of multimedia communications.

UNIT – I : INFORMATION THEORY	**(9 Periods)**
Introduction- Uncertainty- Information and Entropy- Joint and Conditional Entropy- Mutual Information-Channel capacity theorem-Continuous and Discrete Communication Channels – Discrete Memory less Channels- Channel representations-Noiseless Channel- Lossless Channels- Deterministic- Binary Symmetric Channel (BSC)- Binary Erasure Channel (BEC) and their capacities.	
UNIT – II : SOURCE CODING TECHNIQUES	**(9 Periods)**
Coding for Discrete memory less sources- Fixed length code words- variable length code words- Kraft Inequality- Prefix Coding- Shannon's First- Second and third theorem- Shannon binary Encoding- Shannon-Fano Encoding- Huffman Coding- Minimum and Maximum Variance Method.	
UNIT – III : ERROR CONTROL CODING	**(9 Periods)**
Types of Errors- Types of Codes- Linear Block Codes- Error Detection and Error Correction capabilities of Linear Block Codes- Binary Cyclic Codes- Encoding using Shift Register- Syndrome Calculation-Error Detection and Correction- Convolutional Codes-Encoder and Decoders for Convolutional Codes-Viterbi decoding.	
UNIT – IV : COMPRESSION TECHNIQUES	**(9 Periods)**
Principles – Text compression – Static Huffman Coding – Dynamic Huffman Coding, Arithmetic Coding – Image Compression – Graphics Interchange Format – Digitized Documents – Introduction to JPEG Standards.	
UNIT – V : AUDIO AND VIDEO CODING	**(9 Periods)**
Linear Predictive Coding- Code excited LPC- Perceptual Coding- MPEG audio coders- Dolby audio coders – Video compression – principles – Introduction to H.261 and MPEG video standards.	
CONTACT PERIODS:	
Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**	

Text Books:

1.Simon Haykin," Communication Systems", John Wiley and Sons, fifth edition, 2010.
2. Ranjan Bose," Information Theory, Coding and Cryptography", Tata McGrew Hill, second Edition, 2008.

Reference Books:

1. *K. Sam Shanmugam,"Digital and Analog Communication Systems", JohnWiley and Sons,2010.*
2. *T. M. Cover and J. A. Thomas, "Elements of Information Theory", John Wiley and Sons, second edition,2006*
3. *Andre Neabauer, "Coding Theory: Algorithms, Architectures & Applications", Wiley Publications, 2010*

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Apply the basics of information theory to calculate channel capacity and other measures. **[Understand]**
CO2: Evaluate suitable source coding technique to improve channel utilization. **[Understand]**
CO3: Apply linear block codes, cyclic codes and convolution codes error detection and correction in the communication networks. **[Understand]**
CO4: Use Compression and Decompression techniques. **[Understand]**
CO5: Apply the concepts of multimedia communication. **[Understand]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L	L	L		M		L				L		L	L
CO2	M	M	L	L	L		L	M			L		M	L
CO3	H	H	L	L	L		L	M			L		M	L
CO4	H	H	L	L	L		L	M			L		M	L
CO5	H	H	L	L	L		L	M			L		M	L
16IPC403	H	H	L	L	L		L	M			L		M	L

L-Low, M-Moderate (Medium) and H-High

16IPC404 DATABASE SYSTEMS CATEGORY: PC

L	T	P	C
3	0	0	3

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Conceptual data and relational model.
* Principles and efficient use of storage space using normalization techniques.
* Constructing simple and moderately advanced database queries using query language.
* Concept of database and related database facilities including concurrency control, backup and recovery, data object locking protocols.
* Basics of current trends.

UNIT – I : INTRODUCTION AND CONCEPTUAL MODELING	**(9 Periods)**
Introduction to File and Database systems – Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.	
UNIT – II : RELATIONAL MODEL	**(9 Periods)**
SQL – Data definition – Queries in SQL – Updates – Views – Integrity and Security – Relational Database design – Functional dependences and Normalization for Relational Databases.	
UNIT – III : DATA STORAGE AND QUERY PROCESSING	**(9 Periods)**
Record storage and Primary file organization – Secondary storage Devices – Operations on Files – Heap File – Sorted Files –Hashing Techniques – Index Structure for files –Different types of Indexes – B –Tree –B+ Tree – Query Processing.	
UNIT – IV : TRANSACTION MANAGEMENT	**(9 Periods)**
Transaction Processing – Introduction – Need for Concurrency control – Desirable properties of Transaction – Schedule and Recoverability – Serializability and Schedules – Concurrency Control – Types of Locks – Two Phases locking – Deadlock –Time stamp based concurrency control – Recovery Techniques – Concepts – Immediate Update – Deferred Update – Shadow Paging.	
UNIT – V : CURRENT TRENDS	**(9 Periods)**
Object –Relational and Object oriented databases Introduction to NOSQL –Mongo DB –Creating – Updating and Deleting Documents –Querying –Indexing	
CONTACT PERIODS:	
Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**	

Text Books:

1. *RamezElmasri and Shamkant B. Navathe,"Fundamental Database Systems" Sixth Edition, Pearson Education, 2011*
2. *Kristina Chodorow,"MongoDB: The Definitive Guide", Second Edition,O'Reilly Publication, 2013*

Reference Books:

1. *Abraham Silberschatz, Henry F. Korth and S. Sudarshan -"Database System Concepts", Sixth Edition, McGraw-Hill, 2011.*
2. *Raghu Ramakrishnan,JohannesGehrke"Database Management System", Tata McGraw-Hill Publishing Company, 3rd edition,2003*
3. *Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000.*
4. *Peter Rob and Corlos Coronel- "Database System, Design, Implementation and Management", Thompson Learning Course Technology- Fifth edition, 2003.*

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Build a database management system that satisfies relational theory **[Understand]**

CO2: Systematically design appropriate database structure using normalization, data modeling and retrieve the information using SQL. **[Analyze]**

CO3: Illustrate data storage, query processing and optimization techniques such as B Tree, B+ Tree structure. **[Understand]**

CO4: Explain the concepts of transaction managements **[Familiarize]**

CO5: Use open source databases. **[Understand]**

COURSE ARTICULATION MATRIX:

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	M	M	H	M	H			L			M		M	L
CO2	H	H	H	H	H	L		L			M		H	L
CO3	M	M	M	M	H						M		M	
CO4	M	L	L	L	L						M		L	
CO5	H	H	H	H	H						M		H	
16IPC404	M	M	H	M	H	L		L			M		M	L

L-Low, M-Moderate (Medium) and H-High

16IPC405 **OPERATING SYSTEMS** **CATEGORY: PC**

L	T	P	C
3	0	0	3

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Structure and functions of OS
* Processes, Threads and Scheduling algorithms
* Principles of concurrency and Deadlocks
* Memory management schemes
* I/O management and File systems

UNIT – I : INTRODUCTION	**(9 Periods)**
Computer System Overview-Basic Elements- Instruction Execution- Interrupts- Memory Hierarchy-Cache Memory- Direct Memory Access- Multiprocessor and Multicore Organization- Operating system overview-objectives and functions- Evolution of Operating System.	
UNIT – II : ROCESSES	**(9 Periods)**
Process: States-Process Description and Process Control- IPC- Processes and Threads-Types of Threads-Multicore and Multithreading- Windows 10- Thread and SMP Management.	
UNIT – III : CONCURRENCY AND SCHEDULING	**(9 Periods)**
Principles of Concurrency - Mutual Exclusion- Semaphores- Monitors- Readers/Writers problem. Deadlocks – prevention- avoidance – detection- Scheduling- Types of Scheduling – Scheduling algorithms.	
UNIT – IV : MEMORY	**(9 Periods)**
Memory management requirements-Partitioning-Paging and Segmentation-Virtual memory - Hardware and control structures-operating system software- Linux memory management-Windows memory management.	
UNIT – V : INPUT/OUTPUT AND FILE SYSTEMS	**(9 Periods)**
I/O management and disk scheduling – I/O devices- organization of I/O functions; OS design issues-I/O buffering- disk scheduling-Disk cache. File management – Organization-Directories-File sharing- and Record blocking- secondary storage Management.	
CONTACT PERIODS:	
Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**	

Text Books:

1.Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", 9th Ed., John Wiley, 2008

2. AS Tanenbaum, "Modern Operating Systems", 4th Ed., Pearson, 2009.

Reference Books:

1. William Stallings, "Operating Systems: Internals and Design Principles",Prentice-Hall, 7th Ed., 2008.
2. AS Tanenbaum, AS Woodhull, "Operating Systems Design and Implementation,"3rd Ed., Prentice Hall, 2006.
3. J. Bach, "Design of the Unix Operating System, Prentice Hall of India",1986.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Explain the structure and functions of OS. **[Familiarity]**
CO2: Schedule Processes, Threads and Scheduling algorithms **[Usage]**
CO3: Solve problems related to concurrency and Deadlocks **[Usage]**
CO4: Apply memory management schemes. **[Usage]**
CO5: Explore I/O management and File systems **[Familiarity]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H												L	
CO2	H	H	H	M	M						L	L	H	L
CO3	H	H	H	M	M						L	L	H	L
CO4	H	H	H	M	M						L	L	H	L
CO5	H	H	M	M	M						L	L	H	L
16IPC405	H	H	H	M	M						L	L	H	L

L-Low, M-Moderate (Medium) and H-High

16IPC406 **ANALYSIS AND DESIGN OF ALGORITHMS** **CATEGORY: PC**

L	T	P	C
3	0	0	3

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Significance of complexity of the algorithm
* Principles of algorithm design
* Concepts of approximation and randomized algorithms
* Dynamic programming, Greedy technique, Amortized Algorithm
* Analysis of Graph Algorithms

UNIT – I : ALGORITHM COMPLEXITY	**(9 Periods)**
Overview of Algorithms -Asymptotic complexity - Principles of Algorithm Design –Probabilistic Analysis and Randomized Algorithms: Indicator random variables-Randomized algorithms, Iterative approach to solve sorting problem : Insertion Sort- divide and conquer approach to solve sorting problem: Quick Sort-Merge Sort- Using Data structure approach : Heap sort , Sorting in Linear time : Counting Sort-Radix Sort-Bucket Sort	
UNIT – II : ALGORITHM DESIGN FOR DYNAMIC SETS	**(9 Periods)**
Introduction : Elements of a Dynamic set-operations on dynamic sets, Elementary Data Structures : Stack and Queues-Linked lists,Hash tables :Direct-address tables,Hash tables,Hash functions, Open addressing, Binary Search trees: Querying a binary search tree-Insertion and deletion, Red Black Trees:Properties of red-black trees-Rotations-Insertion-Deletion	
UNIT – III : ALGORITHM DESIGN FOR ADVANCED DYNAMIC SETS	**(9 Periods)**
B Trees : Definition of B Trees –Basic Operations on B trees –Deleting a key from B Tree ,Fibonacci heaps : Structure of Fibonacci heaps-Decreasing a key and deleting a node ,Data Structures for Disjoint sets : Disjoint Set Operations-Linked List Representation of Disjoint sets –Disjoint Set Forests-Tries	
UNIT – IV : ADVANCE ALGORITHM DESIGN TECHNIQUES	**(9 Periods)**
Dynamic Programming : Elements of dynamic programming -Rod cutting-Matrix chain multiplication – Longest Common subsequence-Greedy Algorithm : Elements of the greedy strategy -An activity selection problem –Huffman codes Amortized Analysis :Aggregate analysis- accounting method- potential method	
UNIT – V : GRAPH ALGORITHMS AND NP COMPLETENESS	**(9 Periods)**
Introduction - Elementary Graph Algorithms-Representations of graphs-Topological Sort-Strongly connected components, Minimum Spanning Trees: The algorithms of Kruskal and Prim, Single-Source Shortest Paths: The Bellman-Ford algorithm- Single-source shortest paths in directed acyclic graphs-Dijkstra's algorithm-Difference constraints and shortest paths-Proofs of shortest-paths properties,All-Pairs Shortest Paths:Shortest paths and matrix multiplication: The Floyd-Warshall algorithm. NP Complete : Introduction to NP complete –hamiltonian circuit-subset sum and partition	
CONTACT PERIODS:	
Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**	

Text Books:

1. Thomas H. Cormen Charles E. Leiserson Ronald L. Rivest Clifford Stein, " Introduction to Algorithms" Third edition, The MIT press 2009
2. Michael T. Good rich , Roberto Tamassia," Algorithm Design: Foundations,Analysis,and Internet Examples", Second Edition Wiley India,2006

Reference Books:

1. Anany Levitin ,"Introduction to the Design and Analysis of Algorithms", Pearson education , second edition 2015
2. Jon Kleinberg and Eva Tardos,"Algorithm Design ", Pearson united states edition 2005.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Compare the complexity of algorithms in problem solving process. **[Analyze]**
CO2: Analyze asymptotic runtime complexity of algorithms for dynamic sets.**[Analyze]**
CO3: Analyze asymptotic runtime complexity of algorithms for advanced dynamic sets.**[Analyze]**
CO4: Apply dynamic programming and Greedy algorithms. **[Understand]**
CO5: Apply graph algorithm to deal with network problems.**[Understand]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	H	H	H	L				L		L	L	H	M
CO2	H	H	H	H	L			L	L		L	L	H	M
CO3	H	H	H	H	L			L	L		L	L	H	M
CO4	H	H	H	H	L				L		L	L	H	M
CO5	H	H	H	H	L				L		L	L	H	M
16IPC406	H	H	H	H	L			L	L		L	L	H	M

L-Low, M-Moderate (Medium) and H-High

16IPC407 **DATABASE SYSTEMS LABORATORY** **CATEGORY: PC**

L	T	P	C
0	0	4	2

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Usage of DDL, DML and TCL commands.
* Querying the database using relational algebra operations.
* Concepts of triggers, functions and stored procedures in PL/SQL and NOSQL.

LIST OF EXPERIMENTS

1. DDL, DML, DCL and TCL commands.
2. Built in functions and Relational Algebra operations in open source DBMS-MySQL.
3. Materialized views.
4. Embedded SQL
5. Stored Procedures, Functions in PL/SQL
6. Cursors, Packages and Triggers in PL/SQL.
7. Study of NOSQL Databases
8. Mini Project: (Any application development using Oracle/MySQL/ NOSQL/Postgres) Developing applications such as Payroll processing system, Banking system, Inventory control system, Reservation system, College/Library/Hospital/Hotel Management system, Personal Information systems and Timetable management systems etc.

CONTACT PERIODS:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 60 Periods** **Total: 60 Periods**

COURSE OUTCOMES:

CO1: Upon completion of this course, the students will be able to,
CO2: Design and implement a database schema for a given problem-domain.**[Analyze]**
CO3: Populate and query a database using SQL DDL/ DML/TCL commands. **[Analyze]**
CO4: Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS. **[Analyze]**
CO5: Programming PL/SQL and NOSQL including stored procedures, stored functions, cursors, packages.**[Analyze]**
CO6: Design and build a GUI application. **[Analyze]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	H	H	M	H	L		M	M	M	H		H	M
CO2	M	M	H	M	H			M	L	L	H		M	M
CO3	M	M	M	M	H			M	M	M	H		M	M
CO4	H	H	H	H	H			M	M	M	H		H	M
CO5	H	H	H	H	H	M		M	M	M	H		H	M
16IPC407	H	H	H	M	H	L		M	M	M	H		H	M

L-Low, M-Moderate (Medium) and H-High

16IPC408	OPERATING SYSTEMS LABORATORY	CATEGORY: PC

L	T	P	C
0	0	4	2

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with,

* Basic structure, operations and addressing modes of computer.
* Representation of Fixed point and floating point operations.
* Basic Organization and operations of data path, control path and pipelining
* Memory organization, Cache Optimization and I/O data transfer.
* Parallel processing architectures.

LIST OF EXPERIMENTS

1. UNIX Commands and Shell Programming
2. Inter Process Communication
3. CPU scheduling algorithms
4. Process Synchronization
5. Deadlock Prevention and Avoidance
6. Paging and Segmentation
7. Page Replacement Algorithms
8. File Organization Techniques
9. File allocation strategies
10. Disk Scheduling Algorithms

CONTACT PERIODS:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 60 Periods** **Total: 60 Periods**

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Implement shell scripts and Inter Process Communication.**[Understand]**

CO2: Implement CPU scheduling algorithms and memory management schemes**[Understand]**

CO3: Implement algorithms for deadlock prevention and avoidance **[Understand]**

CO4: Implement file structure and allocation of disk space. **[Understand]**

CO5: Identify the best disk scheduling algorithm to improve the performance. **[Understand]**

COURSE ARTICULATION MATRIX:

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	L		H				M		H			H	H	H
CO2	M			M			H						M	M
CO3	H				M		H		M			H	H	L
CO4	H						H						M	M
CO5	L								H				L	L
16IPC408	H		H	M	M		H		H			M	H	H

L-Low, M-Moderate (Medium) and H-High

16IEE409 HARDWARE TROUBLESHOOTING TECHNIQUES CATEGORY: EEC

L	T	P	C
0	0	4	2

PRE-REQUISITE:

NIL

COURSE OBJECTIVES:

Upon completion of this course, the students will be familiar with.

- Motherboard and its interfacing
- Installing and uninstalling OS and drivers
- Disk partitioning and DOS commands
- Assembling and disassembling of hardware.
- Basic network operations

LIST OF EXPERIMENTS

EXERCISES ILLUSTRATING THE FOLLOWING CONCEPTS:

1. Study of Motherboard and its interfacing components
2. Study of Booting Process.
3. Install, upgrade and configure Windows operating systems.
4. Disk formatting, partitioning and Disk operating system commands
5. Install and configure computer drivers and system components.
6. Study of hubs and switch.
7. Configuring LAN, IP address and Domain name system
8. Install, upgrade and configure Linux operating systems.
9. Installation of printer and scanner software.
10. Disassembly and Reassembly of hardware

CONTACT PERIODS:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 60 Periods** **Total: 60 Periods**

COURSE OUTCOMES:

Upon completion of this course, the students will be able to,

CO1: Understand the components of motherboard **[Familiarize]**
CO2: Manage the hard disk drive by formatting and partitioning **[Analyze]**
CO3: Install, upgrade and configure OS, drivers and Network connections. **[Analyze]**
CO4: Assemble and disassemble a computer system. **[Analyze]**
CO5: Perform network operations **[Analyze]**

COURSE ARTICULATION MATRIX:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H		L										M	
CO2	H		L		M								M	
CO3	H		L		M								M	
CO4	H		L		M								M	
CO5	H												M	
16IEE409	H		L		L								M	

L-Low, M-Moderate (Medium) and H-High