

Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

SCHEME OF INSTRUCTION & SYLLABI

Programme: Computer Science & Engineering

Scheme of Instructions: Second Year B. E. in Computer Science & Engineering

Semester – IV

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	BSC	BCS2401	Discrete Mathematics & Graph Theory	3	1	-	4	4	15	15	10	60	100
2	PCC	BCS2402	Software Engineering	3	-	-	3	3	15	15	10	60	100
3	PCC	BCS2403	Operating System	3	-	-	3	3	15	15	10	60	100
4	PCC	BCS2404	Database Management System	3	-	-	3	3	15	15	10	60	100
5	PCC	BCS2405	Theoretical Foundation of Computer Science	3	1	-	4	4	15	15	10	60	100
6	PCC	BCS2406	Computer Network	3	-	-	3	3	15	15	10	60	100
7	PCC	BCS2407	Database Management System Lab	-	-	2	2	1	-	-	25	25	50
8	PCC	BCS2408	Operating System Lab	-	-	2	2	1	-	-	25	25	50
9	PCC	BCS2409	Computer Network Lab	-	-	2	2	1	-	-	25	25	50
10	PROJ	BCS2410	Micro Project I	-	-	2	2	1	-	-	25	25	50
11	MCC	BAU2404	Group Reading of Classics	2	-	-	2	Audit	-	-	-	-	-
			Total	20	02	08	30	24	90	90	160	460	800

L- Lecture

T-Tutorial

P-Practical

CT1- Class Test 1

TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2

ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	Project / Seminar / Industrial Training	MCC (Mandatory Courses)
Credits	--	04	--	19	--	--	01	Yes
Cumulative Sum	06	26	18	31	--	--	01	--

PROGRESSIVE TOTAL CREDITS : 58+24 = 82

[Signature]
HOD (CSE)
 Deptt.
 Tulsiramji Gaikwad-Patil College
 of Engineering & Technology
 Nagpur

[Signature]
Dean Academics
 Tulsiramji Gaikwad-Patil
 College Of Engineering
 and Technology, Nagpur

[Signature]
Principal
 Tulsiramji Gaikwad-Patil College of Engg. and
 Technology, Nagpur



Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B. Tech. Computer Science and Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2401	Discrete Mathematics and Graph Theory	3	1	-	4

Course Contents

Unit I	Sets: Sets, Types & Operation on sets, Mathematical Induction. Review of Logical Operations, Relations: Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams. Functions: Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems..
Unit II	Combinatorics: Rules of Sum and Product, Permutations, Combinations. Pigeonhole Principle, Recurrence Relation, Linear Recurrence Relations with Constant Coefficients, Total Solutions, Applications of Relations and Functions.
Unit III	Groups, Ring and lattices: Algebraic Systems, Semi Groups, Groups, Monoid, Abelian Groups, subgroups, Isomorphism, Automorphisms and Homomorphism group, Rings, Integral Domain and Fields Lattices and Algebraic Systems, Principle of duality, Properties of Algebraic system defined by Lattices, Boolean Lattices.
Unit IV	Fuzzy Set & Fuzzy Logic : Fuzzy sets & systems, Crisp set, operations & combinations on Fuzzy set, Relation between Crisp and Fuzzy set, Fuzzy Relation, Overview of Fuzzy Logic & classical logic.
Unit V	Graph Theory: Basic concepts of graph theory, Digraphs, Basic definitions, Matrix representation of graphs, Subgraphs and quotient graphs, Isomorphic graphs, Paths and circuits, Reach ability and connectedness, Node base, Euler's path & Hamilton's path, Tree, Binary tree, Undirected tree, Spanning tree, Weighted graphs (Only definitions and examples), Minimal spanning tree by Prim's algorithm &Kruskal's algorithm, Representation of algebraic expressions by Venn diagram and binary tree.

Text Books

T1	C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4th Edition, McGraw-Hill
T2	Kenneth H. Rosen, "Discrete Mathematics and its Applications", & 7th edition, McGraw-Hill
T3	Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, "Discrete mathematical structures", 6 th edition, Prentice Hall of India.


Reference Books

R1	Edgar G. Goodaire, Michael M. Parmenter, "Discrete Mathematics with Graph Theory", 3rd Edition, Pearson Education
R2	Tremblay J. S., "Discrete mathematical structures with application", 3rdEdition, Tata McGraw Hill

Useful Links

1	https://nptel.ac.in/courses/106/106/106106183/
2	https://nptel.ac.in/courses/111/107/111107058/

	Course Outcomes	CL	Class Sessions
BCS2401.1	Apply formal proof techniques & Analyze types of relations and functions to solve the problems.	3	9
BCS2401.2	Solve recurrence relations, generating functions and combinatorial problems.	4	9
BCS2401.3	Apply the concepts of Groups, Rings and Lattices	3	9
BCS2401.4	Interpret fuzzy set theory and uncertainty concepts	4	9
BCS2401.5	Analyze computational problems in graph theoretical framework.	3	9


HOD

Deptt. (CSE)
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohagan, Wardha Road, Nagpur





Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B.Tech. Computer Science & Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2402	Software Engineering	3	-	-	3

Course Contents

Unit I	Introduction: Software Characteristics, Software Engineering A Layered Technology, Software Process Framework, Software Myths Software Engineering Principles and Practice: Communication Practices, Planning Practices, Modeling Practices, Construction Practice & Deployment, System Engineering Hierarchy, System Modeling, Requirements Engineering process, Eliciting Requirement: Case Study Software Requirements Specification.
Unit II	Software Process Models The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, COCOMO Model, Agile Process Models, Agile metrics, Extreme Programming (XP), Scrum, Kanban, Software Deployment. Data modeling: , Scenario Based Modeling, Flow Oriented Modeling, Class based Modeling, Behavioral Model,
Unit III	Design Concepts: Abstraction, Pattern modularity, Information hiding, Design classes, Refactoring. Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture.
Unit IV	Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. Product metrics: Software Quality, Framework for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality.
Unit V	Quality Management Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards. Risk management - Risk strategies, Software risks, Risk identification, Risk refinement, RMMM, Risk Response development & Risk Response Control, Risk Analysis: Agile risk management using Jira, Change Management- Software Configuration Management, SCM Repository, SCM Process, Estimation, Software reengineering, Reverse Engineering: A practical approach

Text Books

T1	Software Engineering-A Practitioner's Approach (Sixth Edition)-Roger Pressman (TMH)
T2	Software Engineering (Ninth Edition)-Ian Sommerville (Pearson Education)
T3	Software Engineering: Theory and Practice (Fourth Edition) – Pfleeger

Reference Books

R1	Software Engineering-Schaum's Series (TMH)
R2	Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
R3	Rajib Mall, Software Project Management, 5th Edition, McGrawHill

Useful Links

1	https://nptel.ac.in/courses/106/101/106101061/
---	---

	Course Outcomes	CL	Class Sessions
BCS2402.1	Understand the knowledge of basic Software Engineering Principals and Practices.	2	09
BCS2402.2	Analyze fundamentals of software process models.	4	09
BCS2402.3	Apply designing Concept for creating software architectural design.	3	09
BCS2402.4	Understand software Testing strategies, Unit Testing, system testing and Product metrics	2	09
BCS2402.5	Analyze steps for improving the software quality	4	09

Patil
HOD

Deptt. (CSE)
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohagaon, Wardha Road, Nagpur



**Tulsiramji Gaikwad-Patil College of Engineering and Technology**

Wardha Road, Nagpur-441 108

An Autonomous Institute Affiliated to RTM Nagpur University

NAAC Accredited (A+ Grade)

**Program: B. Tech. Computer Science and Engineering**

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2403	Operating System	3	-	-	3

Course Contents

Unit I	Introduction Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, OS structure: Layered, Monolithic, Microkernel Operating Systems.
Unit II	Process Management & Scheduling Process concept, Process control Block, Process states, Primitive and Non-Primitive Processes, Types of scheduler, context switch, threads, multithreading model. Goals of scheduling and different scheduling algorithm (FIFO, SJF, Priority, and Round Robin).
Unit III	Process Cooperation and Synchronization Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems. Deadlock characteristics, Prevention, Avoidance, Detection and recovery.
Unit IV	Memory Management Contiguous allocation, Relocation, Paging, Segmentation, Segmentation with paging, demand paging, page faults and instruction restart, page replacement algorithms File Systems: File concept, Access methods, Disk space management and space allocation strategies, directory structures, Recovery, Log-structured File System, disk scheduling algorithms.
Unit V	Protection & Recovery Goals of Protection, access matrix, implementation, Security problem.

Text Books

- | | |
|-----|---|
| T.1 | Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010). |
| T.2 | Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008). |
| T.3 | Operating Systems by D.M. Dhamdhere, Tata McGraw Hill 2nd edition. |

Reference Books

- | | |
|-----|--|
| R.1 | Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000 |
| R.2 | Operating System: Concepts and Design by Milan Milenkovic, McGraw Hill Higher Education |

Useful Links

- | | |
|---|---|
| 1 | https://nptel.ac.in/courses/106/105/106105214/ |
| 2 | https://nptel.ac.in/courses/106/102/106102132/ |

	Course Outcomes	CL	Class Sessions
BCS2403.1	Recognize OS evolution and structures.	2	9
BCS2403.2	Discuss a process scheduling algorithms.	2	9
BCS2403.3	Demonstrate Process Deadlock and its prevention.	3	9
BCS2403.4	Interpret memory management problems and file access techniques.	3	9
BCS2403.5	Analyze OS Security & its protection	4	9

[Signature]

HOD

(CSE)

Deptt.
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohagaon, Wardha Road, Nagpur





Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B. Tech. Computer Science & Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2404	Database Management System	03	-	-	03

Course Contents

Unit I	INTRODUCTION TO DBMS Introduction: Database Concepts, Database System Architecture. Data Modeling: Data Models, Basic Concepts, entity, attributes, relationships, constraints, keys. E-R diagrams: Components of E-R Model, conventions, converting E-R diagram into tables Relational Model: Basic concepts, Attributes and Domains, Codd's Rules. Relational Integrity: Domain, Entity, Referential Integrities, Schema Diagram. Relational Algebra: Basic Operations, Tuple and Domain relational calculus.
Unit II	INTRODUCTION TO SQL and PL/SQL SQL: Characteristics and advantages, SQL Data Types, DDL, DML, SQL Operators, order by, distinct, like, in, between, all, any, joins, set operations, aggregate functions, group by clause, having clause, Sub queries, alias, sequence, handling null values, CASE, single row functions. DCL, TCL. PL/SQL : Constant, variables, Operators, Control Structures, Loops, Procedures
Unit III	DATABASE DESIGN Database Design: Functional Dependency, Purpose of Normalization, Single Valued Normalization: 1NF, 2NF, 3NF, BCNF. Decomposition: lossless join decomposition dependency preservation, Multi valued Normalization (4NF), Join Dependencies, and the Fifth Normal Form.
Unit IV	PHYSICAL AND LOGICAL: Concept of Physical and logical hierarchy. Concept of index, B-trees, Concepts of Functional dependency. QUERY PROCESSING AND OPTIMIZATION Overview: Query Processing and Optimization, measures of query cost estimation in query optimization, pipelining and Materialization, Structure of query evaluation plans.
UnitV	DATABASE TRANSACTIONS Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, two-phase locking protocol, Isolation, Intent locking Recovery System: failure classification, checkpoints, buffer management, Aries Algorithm.

Text Books

T1	Database System Concepts by AviSilberschatz, Henry F. Korth, S. Sudarshan, Tata McGraw Hill, Fifth Edition.
T2	Fundamentals of Database Systems – Elmasiri and Navathe, Addison Wesley, 2000.
T3	An introduction to Database Systems, C J Date, A.Kannan, S.Swamynathan –Eight Edition.

Reference Books

R1	Database Management Systems - by Raghu Ramakrishnan and Johannes Gehrke, Tata McGraw Hill Publication, Third Edition.
R2	Data Mining Techniques, Arun K Pujari, 3rd edition, Orient Blackswan/Universities Press, 2013

Useful Links

1	https://nptel.ac.in/courses/106/105/106105175/
2	https://nptel.ac.in/courses/106/104/106104135/

	Course Outcomes	CL	Class Sessions
BCS2404.1	Understand the basic elements of a relational database management system.	2	9
BCS2404.2	Apply RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.	3	9
BCS2404.3	Analyze the basic of physical, logical memory system and Query Processing and Optimization techniques.	4	9
BCS2404.4	Analyze transaction properties , serializable concept and understand locking mechanism	4	9
BCS2404.5	Implement Advance Recovery systems, Remote Backup systems and Understand basic concept of Data warehouse and Mining	3	9

HOD

Deptt. (CSE)

Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohagaon, Wardha Road, Nagpur



**Tulsiramji Gaikwad-Patil College of Engineering and Technology**

Wardha Road, Nagpur-441 108

An Autonomous Institute Affiliated to RTM Nagpur University

NAAC Accredited (A+ Grade)

**Program: B. Tech. Computer Science and Engineering**

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2405	Theoretical Foundation of Computer Science	3	1	-	4

Course Contents

Unit I	Set theory, strings, induction proof, pigeon-hole principle, concept of language, formal grammars, Chomsky hierarchy. Finite automata, regular languages, deterministic & non-deterministic finite automata, ϵ -closures, minimization of automata, equivalence.
Unit II	Regular expression, identities, Regular grammar, right linear, left linear, Pumping lemma for regular sets, Moore and Mealy machine
Unit III	Context free languages, parse trees and ambiguity, reduction of CFGS, Normal forms for CFG. Push down Automata (PDA), non-determinism. Conversion of PDA to CFG, CFG to PDAs, closure and decision properties of CFLs, pumping lemma for CFL.
Unit IV	Turing machines, TM as acceptor, TM as transducers, Variations of TM, linear bounded automata, TM as computer of function. Universal TM
Unit V	Recursively enumerable (r.e.) set, recursive sets, Decidability and solvability, Post correspondence Problem (PCP), Introduction to recursive function theory, primitive recursive functions, Ackerman function

Text Books

T.1	Introduction to Theory of Computations by John Martine, TMH publication
T.2	Introduction to Theory of Computation by Michael Sipser.
T.3	Introduction to Theory of Computations by O. G. Kakade, Laxmi Publication

Reference Books

R.1	Introduction of Automata Theory, Languages and Computation by Hoffcroft, Ullman and Motwani, Pearson Education
R.2	Introduction to formal languages and automata by Peter Linz
R.3	Elements of the theory of Computation by H. R. Levis, C. H. Papadimitriou, PHI

Useful Links

1	https://onlinecourses.nptel.ac.in/noc21_cs83
---	---

	Course Outcomes	CL	Class Sessions
BCS2405.1	Execute finite automata for simple regular language.	3	9
BCS2405.2	Analyze regular language by regular expression.	4	9
BCS2405.3	Illustrate PDA for CFL.	4	9
BCS2405.4	Analyze working of Turing machine and TM for small set of languages/computations	4	9
BCS2405.5	Apply recursive functions and decompose problem into smaller problem.	3	9



HOD

Deptt. (CSE)

Pulsiramji Gaikwad-Patil College
of Engineering & Technology
Waghgaon, Wadga Road, Nagpur



**Tulsiramji Gaikwad-Patil College of Engineering and Technology**

Wardha Road, Nagpur-441 108

An Autonomous Institute Affiliated to RTM Nagpur University

NAAC Accredited (A+ Grade)

**Program: B. Tech. Computer Science and Engineering**

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2406	Computer Network	3	-	-	3

Course Contents

Unit I	Physical Layer: Introduction to Networks (LAN, MAN, WAN, PAN), direction of data flow; Connection topology; Network Devices, Network Model, Transmission Media, Switching, OSI and TCP/IP.
Unit II	Data Link Layer: Types of errors, framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC
Unit III	Network layer: Logical Addressing, IPv4 Addresses, IPv6 Addresses, Routing algorithms: shortest path algorithm, flooding, distance vector routing and link state routing, address mapping: ARP, RARP, Unicast Routing Protocols, Multicast Routing Protocols Routing: static vs. dynamic routing
Unit IV	Medium Access Control: FDDI, token bus, token ring; Reservation, polling, concentration; multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, FDMA, TDMA, CDMA Transport Layer: Internet Protocol (IP) –UDP, TCP, Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm.
Unit V	Application Layer: Domain Name Space (DNS), TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, Digital Signature, Communication satellites, Recent Trends in Network Security

Text Books

T.1	B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH
T.2	A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
T.3	W. Stallings – “Data and Computer Communications (8th Ed.)” – PHI/ Pearson Education

Reference Books

R.1	Kurose and Rose – “Computer Networking -A top down approach featuring the internet” – Pearson Education
R.2	Introduction to Data Communications and Networking by Wayne Tomasi-Pearson Edition
R.3	Comer – “Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)” – Pearson Education/PHI

Useful Links

1	https://nptel.ac.in/courses/108/104/108104139/
2	http://nptel.ac.in/courses/117107095
3	http://nptel.ac.in/courses/117103064

Course Code	Course Outcomes	CL	Class Sessions
BCS2406.1	Apply fundamentals of network formation and network devices in physical layer.	3	9
BCS2406.2	Analyze reliable network by error detection and correction technique in data link layer.	4	9
BCS2406.3	Determine network path with the help of routing algorithm in network layer.	4	9
BCS2406.4	Apply access control protocol for communication in network and reliable transmission of data packets in physical layer.	3	9
BCS2406.5	Examine effective communication in network by application layer.	3	9


HOD
 Deptt. (CSE)
 Tulsiramji Gaikwad-Patil College
 of Engineering & Technology
 Mohagaon, Wardha Road, Nagpur





Tulsiramji Gaiwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B.Tech. Computer Science and Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2407	Database Management System Lab	-	-	2	1

List of Experiment

1	Installation of MySQL Server and Interfacing.	CO1
2	To implement Simple queries: selection, projection, sorting on a simple table 1. Small-large number of attributes 2. Distinct output values 3. Renaming attributes 4. Computed attributes 5. Simple-complex conditions (AND, OR, NOT) 6. Partial Matching operators (LIKE, %, _, *, ?) 7. ASC-DESC ordering combinations 8. Checking for Nulls	CO2
3	To implement Multi-table queries (JOIN OPERATIONS) 1. Simple joins (no INNER JOIN) 2. Aliasing tables – Full/Partial name qualification 3. Inner-joins (two and more (different) tables) 4. Inner-recursive-joins (joining to itself) 5. Outer-joins (restrictions as part of the WHERE and ON clauses) 6. Using where & having clauses	CO2
4	To implement Set Oriented Operations 1. Union 2. Intersect 3. Minus	CO3
5	To implement DDL & TCL Commands. 1. Creating objects: tables, views, users, sequences, Collections etc. 2. Privilege management through the Grant/Revoke commands 3. Transaction processing using Commit/Rollback 4. Save points	CO3
6	Perform following SQL queries on the database. 1. Implementation of relational operators in SQL 2. Boolean operators and pattern matching 3. Arithmetic operations and built in functions 4. Group functions 5. Processing Date and Time functions	CO3

7	Execute DML statements which demonstrate the use of views. Update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables.	CO4
8	Create Table with primary key and foreign key constraints. 1. Alter table with add n modify 2. Drop table	CO4
9	Perform PL/SQL Programming I 1. Programs using named and unnamed blocks	CO5
10	Perform PL/SQL Programming II 1. Creating stored procedures, and packages 2. Creating functions (). 3. Triggers	CO5

	Course Outcomes	CL	Lab Sessions
BCS2407.1	Understand the basic elements of a relational database management system.	2	2
BCS2407.2	Apply RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.	3	2
BCS2407.3	Analyze the basic of physical , logical memory system and Query Processing and Optimization techniques.	4	2
BCS2407.4	Analyze transaction properties , serializable concept and understand locking mechanism	4	2
BCS2407.5	Implement Advance Recovery systems, Remote Backup systems and Understand basic concept of Data warehouse and Mining	3	2


HOD

Deptt. (CSE)
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohadgaon, Wardha Road, Nagpur





Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B. Tech. Computer Science and Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2408	Operating System Lab	-	-	2	1

List of Experiment

1.	Execute C programs using system calls for UNIX operating system.	CO1
2.	Execute C programs to simulate UNIX commands.	CO1
3.	Execute Simple Shell Programs.	CO2
4.	Execute C programs for CPU Scheduling Algorithms	CO2
5	Execute C program for Deadlock Avoidance using Bankers Algorithm	CO3
6	Execute C program for Deadlock Detection Algorithm	CO3
7	Execute C program for Producer Consumer Problem using Semaphores.	CO4
8	Execute C program for IPC using Shared Memory.	CO4
9.	Execute C program for Threading & Synchronization Applications.	CO5
10.	Execute C programs for Memory Allocation Methods with Fixed Partition.	CO5

Text Books

T1	Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010).
T2	Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).
T3	Operating Systems by D.M. Dhamdhare, Tata McGraw Hill 2nd edition.

Reference Books

R1	Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000
R2	Operating System: Concepts and Design by Milan Milenkovic, McGraw Hill Higher Education
R3	Operating Systems, 3rd Edition by Gary Nutt, Pearson Education

Useful Links

1	https://nptel.ac.in/courses/106/105/106105214/
---	---

	Course Outcomes	CL	Lab Sessions
BCS2408.1P	Recognize OS evolution and structures.	2	2
BCS2408.2P	Discuss a process scheduling algorithms.	2	2
BCS2408.3P	Demonstrate Process Deadlock and its prevention.	3	2
BCS2408.4P	Interpret memory management problems and file access techniques.	3	2
BCS2408.5P	Analyze OS Security & its protection	4	2

[Signature]

HOD

Deptt. (CSE)

Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohadgaon, Wardha Road, Nagpur





Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
An Autonomous Institute Affiliated to RTM Nagpur University
NAAC Accredited (A+ Grade)



Program: B. Tech. Computer Science and Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
IV	BCS2409	Computer Network Lab	-	-	2	1

List of Experiment

1.	To demonstrate various network devices.	(CO1)
2.	To demonstrate transmission media.	(CO1)
3.	Implement the even and odd parity in error detection and correction.	(CO2)
4.	Implement the data link layer framing methods.	(CO2)
5.	Configure a network using distance vector routing protocol	(CO3)
6.	To create a Network using link state vector routing protocol.	(CO3)
7.	To perform TCP & UDP protocol using.	(CO4)
8.	To configure TCP/IP protocol in WINDOW/LINUX.	(CO4)
9.	To implement domain name server.	(CO5)
10.	Configure TELNET protocol on router for remote access.	(CO5)

Text Books

T1	B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH
----	---

Reference Books

R1	W. Stallings – “Data and Computer Communications (8th Ed.)” – PHI/ Pearson Education
----	--

Useful Links

1	https://nptel.ac.in/courses/106/105/106105081/
---	---

Course Code	Course Outcomes	CL	Lab Sessions
BCS2409.1	Apply fundamentals of network formation and network devices in physical layer.	3	2
BCS2409.2	Analyze reliable network by error detection and correction technique in data link layer.	4	2
BCS2409.3	Determine network path with the help of routing algorithm in network layer.	4	2
BCS2409.4	Apply access control protocol for communication in network and reliable transmission of data packets in physical layer.	3	2
BCS2409.5	Examine effective communication in network by application layer.	3	2

HOD

Deptt. (CSE)
Tulsiramji Gaikwad-Patil College
of Engineering & Technology
Mohagaon, Wardha Road, Nagpur



Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur