Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

SCHEME OF INSTRUCTION & SYLLABI

Programme: B. Tech Computer Science and Engineering

Scheme of Instructions: Second Year B. Tech. in Computer Science and Engineering (As Per NEP 2020)

Semester – III

SN	Sem	Type	BoS/ Dept	Sub Code	Subject	T/P	Contact Hours			Credits	% Weightage			ESE Duration	Total Marks
							L	P	Hrs		CT/IA	CA	ESE		
1	**III**	**PCC**	CS	BCS32301	Object Oriented Programming	T	2	-	2	**2**	14	06	30	2 Hrs	50
2	**III**	**PCC**	CS	BCS32302	Data Structures	T	3	-	3	**3**	30	10	60	3 Hrs	100
3	**III**	**PCC**	CS	BCS32303	Computer Organization and Architecture	T	3	-	3	**3**	30	10	60	3 Hrs	100
4	**III**	**OEC**	CS	B$$323XX	Open Elective-I	T	4	-	4	**4**	30	10	60	3 Hrs	100
5	**III**	**VEC**	SH	BSH32308	Ethics in Engineering Practices	T	2	-	2	**2**	14	6	30	2 Hrs	50
6	**III**	**MDM**	SH	BSH32303	Numerical Method & Statistical Analysis	T	2	-	2	**2**	14	6	30	2 Hrs	50
7	**III**	**EEMC**	BA	BBA32301	Principles of Project Management	P	-	4	4	**2**	-	50	-	2 Hrs	50
8	**III**	**PCC**	CS	BCS32304	Object Oriented Programming Lab	P	-	2	2	**1**	-	25	25	2 Hrs	50
9	**III**	**PCC**	CS	BCS32305	Data Structures Lab	P	-	2	2	**1**	-	25	25	2 Hrs	50
10	**III**	**CEP**	CS	BCS32309	Community Project	P	-	4	4	**2**	-	50	-	2 Hrs	50
Total							**16**	**12**	**28**	**22**	**132**	**198**	**320**	**23 Hrs**	**650**

Course Category	BSC/ESC (BasicScience Course/ Engineering Science Course.)	PCC (ProgrammeCore courses)	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multidisciplinary courses	VSEC (Skill Course)	Humanities Social Science & Management	Experiential Learning Courses	CC (Liberal Learning Courses
Credits	--	10	-	04	02	--	04	02	--
Cumulative Sum	16 / 13	10	-	04	02	04	04	02	04

PROGRESSIVE TOTAL CREDITS: 43+22=65

Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	Applicable for AY 2024-25 Onwards
HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur	Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur	Vice Principal Tulsiramji Gaikwad-Patil College Of Engineering &	Principal Tulsiramji Gaikwad-Patil College Of Engineering &	June, 2024	1.00	

Programme: Computer Science and Engineering

List of **Program Electives** offered By Computer Science and Engineering Department

Program Elective- I	Program Elective-II	Program Elective- III	Program Elective- IV	Program Elective- V
Semester V	**Semester VI**	**Semester VI**	**Semester VII**	**Semester VIII**
BCS33506 - Artificial Intelligence	**BCS33605-** Neural Network and Fuzzy Logic	**BCS33609 –** TCP/IP	**BCS34702 - MOOC's - 1**	**BCS34805** Natural Language Processing
BCS33507 - Principles of Distributed Systems	**BCS33606-** Cloud Computing	**BCS33610 -** Computer Graphics	**BCS34703 - MOOC's – 2**	**BCS34806** Parallel and Distributed Database
BCS33508 - Design Patterns	**BCS33607-** Software Project Management	**BCS33611 -** Network Security	**BCS34704 - MOOC's – 3**	**BCS34807** Software Testing and Quality Assurance
BCS33509 - Introduction to Data Science	**BCS33608-** Data Visualization Techniques	**BCS33611 -** Blockchain and Distributed Ledger Technology	**BCS34705 - MOOC's - 4**	**BCS34808** Big Data Analytics

Program: Computer Science and Engineering

List of **Open Electives** offered By Computer Science and Engineering Department

Open Elective-I	Open Elective-II	Open Elective-III
Semester-III	**Semester-IV**	**Semester-V**
BCS32306: Object Oriented Programming	**BCS32406:** Introduction DBMS	**BCS32504:** Software Engineering

Course Category	BSC (Basic Science Course)	ESC (Engineering Science Course.)	PCC (Programme Core courses	PEC (Programme Elective courses)	OEC (Open Elective Course)	Multidisciplinary courses	VSEC (Skill Course)	Humanities SocialScience & Management	Experiential Learning Courses	CC (Liberal Learning Courses	Semester WiseCredits
Semester -I	10	05	02	--	--	--	02	--	-	02	**21**
Semester -II	08	08	--	--	--	--	02	02	-	02	**22**
Semester -III	--	--	10	--	04	02	--	04	02	--	**22**
Semester -IV	--	--	10	--	02	02	02	06	-	--	**22**
Semester -V	--	--	11	04	02	04	--	--	-	--	**21**
Semester -VI	--	--	08	08	--	02	02	--	-	--	**20**
Semester -VII	--	--	04	04		--	--	--	12	--	**20**
Semester -VIII	--	--	04	06		02	--	--	08	--	**20**
Cumulative Sum	**18**	**13**	**47**	**20**		**22**	**08**	**12**	**22**	**04**	**166**

HOD (CSE) Deptt. Tulsiramji Gaikwad-Patil College of Engineering & Technology Mohagaon, Wardha Road, Nagpur	Dean Academics Tulsiramji Gaikwad-Patil College Of Engineering and Technology, Nagpur	Vice Principal Tulsiramji Gaikwad-Patil College Of Engineering &	Principal Tulsiramji Gaikwad-Patil College Of Engineering &	**June, 2024**	**1.00**	**Applicable for AY 2024-25 Onwards**
Chairperson	**Dean Academics**	**Vice Principal**	**Principal**	**Date of Release**	**Version**	

Tulsiramji Gaikwad-Patil College of Engineering and Technology
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Second Year (Semester-III) B.Tech. (CSE)

Course Code: BCS32301 (Object Oriented Programming)

Teaching Scheme	
Lectures	2Hrs/week
Tutorial	-
Total Credit	2

Examination Scheme	
CT-1	7 Marks
CT-2	7 Marks
CA	6 Marks
ESE	30 Marks
Total	50 Marks
Duration of CSE: 02Hrs 00Min.	

Course Objective:

1	To understand the basic concepts of object-oriented programming, creation and usage of classes, objects.
2	To understand the methods and analyze the concepts of Inheritance, Interface, Exception and Packages.
3	To study how to handle events and multi-threaded in object oriented programming.
4	Demonstrate the use of a file-based I/O and collections.
5	To learn how GUI applications can be designed and developed in Java using Swings and JDBC.

Course Contents

Unit I	**Introduction to JAVA-**Introduction to Java, Java Virtual Machine, Object Oriented Principle, Object and Classes, Java Keywords, Variable, Data types and Literals in Java, String, Operators and Casting, Control of Flow, (Selection Statements, Iteration Statements), Command Line Argument.
Unit II	**Classes and inheritance:** Introduction to Class and Object, Method Overloading, this Keyword, Constructor, Multilevel Hierarchy, Abstract class. **Package and Interface:** Package (Defining Package, Finding Package), Introduction to Interface, Defining, and Implementing of Interface, Predefined Package.
Unit III	**Exception Handling and Threads:** Exception Handling, Type of Exception, Try, Catch, and Finally. Multiple Catch blocks, Nested Try Statements, throw, throws, Thread Model. **Java – Generics:** Advantage of Java Generics, **Types of Java Generics:** Generic Methods, Bounded Type Parameters, Generic Classes.

Text Books

1	The Complete Reference (8th Edition) by Herbelt Scheldt, Tata McGrawHill Publications
2	Head First Java,2nd Edition by Kathy Sierra, Bert Bates,O'Reilly Media
3	Programming in Java(Fifth edition) by E Balguruswami, McGraw Hill Education

Reference Books

1	Sun Certified Java Programmer for Java 6 by Kathy Sierra
2	The JavaTM Programming Language (3rd Edition) by Arnold, Holmes, Gosling, Goteti
3	Core Java for Beginners by Rashmi Kanta Das (III Edition) Vikas Publication

Useful Links

1	https://nptel.ac.in/courses/106/105/106105191/
2	https://www.nptelvideos.com/video.php?id=1472

	Course Outcomes	CL	Class Session
1	**Define** the Principle of Object-oriented approach to design software.	1	9
2	**Identify** Classes, objects and use of inheritance in programs.	3	9
3	**Make Use** of Exception handling, multithreading in real time situations and Generic Programming.	3	9

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Second Year (Semester-III) B.Tech. (CSE)

Course Code: BCS32302 (Data Structure)

Teaching Scheme	
Lectures	3Hrs/week
Tutorial	-
Total Credit	3

Examination Scheme	
CT-1	15 Marks
CT-2	15 Marks
TA	10 Marks
CSE	60 Marks
Total	100 Marks
Duration of CSE :03Hrs 00Min.	

Course Objective:

1	Understanding Fundamental Data Structures: Students should grasp the fundamental concepts of various data structures such as arrays, linked lists, stacks, queues, trees, and graphs.
2	Analyzing Algorithm Efficiency: Students should learn how to analyze the efficiency of algorithms concerning time complexity and space complexity.
3	Implementing Data Structures: Students should be able to implement various data structures using programming languages such as C, C++, Java, or Python.
4	Understanding Advanced Data Structures: Beyond the basics, students may delve into more advanced data structures such as hash tables, heaps, AVL trees, B-trees, and advanced graph algorithms.
5	Working with Abstract Data Types (ADTs): Students should understand the concept of ADTs and how they relate to data structures. This involves understanding how to encapsulate data and operations within abstract data types, providing clear interfaces for interacting with the data.

Course Contents

Unit I	**Introduction to data structure:** General concepts of data structures, Types of Data Structure with its properties and Operations, Time and space analysis of algorithms, Big oh, theta, and omega notations, Average, best and worst case analysis, Abstract data structure . **Searching & Sorting techniques:** Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Linear and Binary Search.
Unit II	**Stack & Queue:** Representation of Stack & queue using array, Application of stacks, Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks, Linear Queues, Circular Queues, and Priority Queues.
Unit III	**Linked List**: Definition and representation in memory, Implementation of Linked List, Types of linked list: Singly linked list, circular Singly linked list, Doubly linked list and circular doubly linked list, operations: insertion, deletion, searching, traversing. Application of linked list such as polynomial expression, comparisons of linked lists.
Unit IV	**Trees:** Definition and basic terminology, Representation of tree. Basic operations of binary trees and binary search trees (traversals of trees, insertion and deletion of elements). Threaded Binary Trees, the concept of balancing, AVL Trees, B-Trees, B+ Trees,
Unit V	**Graphs:** Representation of Graph, Matrix Representation of Graph, List Representation of Graph, Directed Graphs, graph traversal (BFS and DFS) with complexity analysis, shortest path , Spanning trees. **Hashing:** Hash tables, hash functions, hashing techniques, Collision resolution techniques.

Text Books

1	Classical Data Structure, D. Samanta, Prentice Hall of India.

2	Fundamentals of Computer Algorithms by Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz
3	Data Structures using C, Aaron M. Tanenbaum, Pearson Education
Reference Books	
1	An Introduction to Data Structures and Applications, Jean-Paul Tremblay, Paul G. Sorenson, P. G. Sorenson, Tata McGraw Hill Publication
2	Data Structures using C and C++, Y. Langsam, Pearson Education.
3	Prof.P.S.Deshpande & Prof. O.G.Kakde,"C & Data structures",dreamtech
Useful Links	
1	https://nptel.ac.in/courses/106/105/106105183/
2	https://nptel.ac.in/courses/106/106/106106091/

	Course Outcomes	CL	Class Session
1	**Analyze** different ADTs and their operations and analyze their complexities.	4	9
2	**Understand and Implement** linear data structures like stack and queue.	2	9
3	**Implement** various types of Linked list.	6	9
4	**Summarize** different types of trees, their operations and applications.	2	9
5	**Design** traversal and path finding algorithms for Graphs.	6	9

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Second Year (Semester-III) B.Tech. (CSE)

Course Code: BCS32301 (Object Oriented Programming)

Teaching Scheme	
Lectures	2Hrs/week
Tutorial	-
Total Credit	2

Examination Scheme	
CT-1	7 Marks
CT-2	7 Marks
CA	6 Marks
ESE	30 Marks
Total	50 Marks
Duration of CSE: 02Hrs 00Min.	

Course Objective:

1	To understand the basic concepts of object-oriented programming, creation and usage of classes, objects.
2	To understand the methods and analyze the concepts of Inheritance, Interface, Exception and Packages.
3	To study how to handle events and multi-threaded in object oriented programming.
4	Demonstrate the use of a file-based I/O and collections.
5	To learn how GUI applications can be designed and developed in Java using Swings and JDBC.

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3	Core Java for Beginners by Rashmi Kanta Das (III Edition) Vikas Publication

Useful Links

1	https://nptel.ac.in/courses/106/105/106105191/
2	https://www.nptelvideos.com/video.php?id=1472

	Course Outcomes	CL	Class Session
1	**Define** the Principle of Object-oriented approach to design software.	1	9
2	**Identify** Classes, objects and use of inheritance in programs.	3	9
3	**Make Use** of Exception handling, multithreading in real time situations and Generic Programming.	3	9

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Program: B. Tech Second Year Semester-III (CSE/IT)

Course Code:BSH32303 (Numerical Method & Statistical Analysis)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	2 Hrs/week	**CT-I**	7 Marks	-	-
Practical (P)		**CT-II**	7 Marks	-	-
Total Credits	**2**	**CA**	6 Marks	-	-
Duration of ESE: 2Hrs		**ESE**	30 Marks	-	-
		Total Marks	**50 Marks**	-	-

Course Outcome:

1.	**Analyze** numerical techniques to find the roots of equations different types of equations.
2.	**Apply** the concept of probability and mathematical expectation to real-world Phenomena.
3.	**Apply** the most appropriate Stochastic and sampling techniques for a given applied problem

Course Contents

Unit I	**Numerical Methods**: Error in numerical calculations, Errors in series approximation, Rounding off errors. **Solution of Algebraic and Transcendental Equation:** Bisection method, False position method, Newton –Raphson method, Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordon method. Gauss Seidel method.
Unit II	**Probability Distributions & Mathematical Expectation:** Random variables, discrete and continuous random variable, joint distributions. **Mathematical Expectations:** Definition of mathematical expectation, the variance and standard deviations, moment generating function Binomial, Geometric distribution, Poisson distribution.
Unit III	**Stochastic Process & Sampling Techniques-** **Stochastic Process:** Introduction of Stochastic Process, Classification of Random Process, Stochastic Matrix. Markov Chain, Transition Matrix and state transition Diagram. **Sampling Techniques:** Population, sample, standard error, confidence intervals, Testing a hypothesis, Null hypothesis, Alternative hypothesis, t-test and Chi-square test.

Text Books

T.1	Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
T.2	Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
T.3	Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville
T.4	Probability, Statistics and Random Processes T. Veerarajan.
T.5	Fundamentals of Mathematical Statistics (Modern Approach) S.C. Gupta and V. K. Kapoor 10th Edition

Reference Books

R.1	A Text Book of applied Mathematics, Volume I &II, by P.N. Wartikar& J.N. Wartikar, Poona Vidyarthi Griha Prakashan
R.2	Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
R.3	Mathematics for Engineers by Chandrika Prasad
R.4	A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication

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Program: B. Tech Second Year Semester-III (CSE/IT)

Course Code:BSH32303 (Numerical Method & Statistical Analysis)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	2 Hrs/week	**CT-I**	7 Marks	-	-
Practical (P)		**CT-II**	7 Marks	-	-
Total Credits	**2**	**CA**	6 Marks	-	-
Duration of ESE: 2Hrs		**ESE**	30 Marks	-	-
		Total Marks	**50 Marks**	-	-

Course Outcome:

1.	**Analyze** numerical techniques to find the roots of equations different types of equations.
2.	**Apply** the concept of probability and mathematical expectation to real-world Phenomena.
3.	**Apply** the most appropriate Stochastic and sampling techniques for a given applied problem

Course Contents

Unit I	**Numerical Methods**: Error in numerical calculations, Errors in series approximation, Rounding off errors. **Solution of Algebraic and Transcendental Equation:** Bisection method, False position method, Newton –Raphson method, Solution of system of simultaneous linear equations: Gauss elimination method, Gauss Jordon method. Gauss Seidel method.
Unit II	**Probability Distributions & Mathematical Expectation:** Random variables, discrete and continuous random variable, joint distributions. **Mathematical Expectations:** Definition of mathematical expectation, the variance and standard deviations, moment generating function Binomial, Geometric distribution, Poisson distribution.
Unit III	**Stochastic Process & Sampling Techniques-** **Stochastic Process:** Introduction of Stochastic Process, Classification of Random Process, Stochastic Matrix. Markov Chain, Transition Matrix and state transition Diagram. **Sampling Techniques:** Population, sample, standard error, confidence intervals, Testing a hypothesis, Null hypothesis, Alternative hypothesis, t-test and Chi-square test.

Text Books

T.1	Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
T.2	Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition, Wiley India
T.3	Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville
T.4	Probability, Statistics and Random Processes T. Veerarajan.
T.5	Fundamentals of Mathematical Statistics (Modern Approach) S.C. Gupta and V. K. Kapoor 10th Edition

Reference Books

R.1	A Text Book of applied Mathematics, Volume I &II, by P.N. Wartikar& J.N. Wartikar, Poona Vidyarthi Griha Prakashan
R.2	Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
R.3	Mathematics for Engineers by Chandrika Prasad
R.4	A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication

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Second Year (Semester-III) B.Tech. (CSE)

Course Code: BSH32308 (VEC Ethics in Engineering Practices)

Teaching Scheme	
Lectures	2Hrs/week
Tutorial	-
Total Credit	2

Examination Scheme	
CT-1	7 Marks
CT-2	7 Marks
CA	6 Marks
ESE	30 Marks
Total	50 Marks
Duration of CSE: 02Hrs 00Min.	

Course Objective:

1	To understand the Human Values, Ethics and Engineering Ethics.
2	To understand Professional practices in Engineering for Engineers.
3	To understand types of ethical violations and consequence of their influence on business practice, economy and society in general.

Course Contents

Unit I	**Introduction to Engineer Ethics:** Morals, Values, Integrity & Ethics, What is Engineering Ethics, Importance of Engineering Ethics, Code of Ethics, Potential Moral Problems of Engineering Ethics.
Unit II	**Professional Practices in Engineering:** Happiness, Prosperity & Harmony, Professional Ethics, Engineering Ethics, Principles of Engineering Ethics, Environmental Ethics, Public Interest Litigation (PIL), Intellectual property Rights (IPR).
Unit III	**An Overview of Engineering Ethics:** Ethics in Industry, Professional Practices in Engineering, Ethical behavior, Industry professional malpractices , Workplace Safety, Responsibility and Rights, Basics of business ethics - Corporate Social Responsibility – Issues of Management – Crisis Management.

Text Books

1	A New Look into Social Science : Shabbir, Sheikh and Dwadashiwar, S. Chand Publisher
2	Constitution of India and Professional Ethics: Reddy, G.B. and Mohd. Suhaib, IK International Publishing House. 2006
3	Introduction to Engineering Ethics : Martin, Mik , Roland Schinzinger, 2nd edition (16 February 2009) McGraw-Hill Education;

Reference Books

1	Human Resource Development and Management : A. M. Sheikh, 3rd Revised Edition, S Chand & Co Ltd.
2	"A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet": Sara Baase, 3rd Edition PHI Publications.
3	"Case study in Information Technology Ethics" :Richard A. Spinello, 2nd Edition PHI Publications.
4	"Internet Ethics": Duncan Lanford, Macmillan Education UK.
5	"Computer and Ethics in the Cyber age": D. Micah Hester and Paul J. Ford.

Useful Links

1	https://nptel.ac.in/courses/110/105/110105079/

2	https:://nptel/courses/video/1101323279/L54.html
3	https:://nptel/courses/video/110105079/L54.html

	Course Outcomes	CL	Class Session
1	**Describe** Basic Human Values, Ethics & Importance of Engineering Ethics.	2	9
2	**Illustrate the** Basic Ethics for Engineers, Principles of Engineering Ethics & Fundamental Rights of individuals of society.	2	9
3	**Discuss** Ethics for Engineer Professionals, and their Safety, Responsibility & Rights.	2	9