DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus III to IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Computer Science and Engineering

3rd & 4th Semester B.E

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a centre of highest calibre of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenge.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth**.**

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

Computer Science Engineering (CSE) is an Engineering discipline that encompasses a variety of topics related to Computation, Algorithms, Programming Languages, Program Design, Computer Hardware, Computer Software, Operating System, Networking, Machine Learning, Computer Graphics, Computer Vision , Internet of Things, Big Data etc. The CSE Department is committed for creating a community of students that reflects the diversity of the world we live in, contributing to educational excellence and a dynamic campus environment. Our goal is not only to teach students, how to use current computer applications, but rather to educate them so that they understand how these applications work and can design and build the computer applications of the future.

VISION OF THE DEPARTMENT

Epitomize CSE graduate to carve a niche globally in the field of computer science to excel in the world of information technology and automation by imparting knowledge to sustain skills for the changing trends in the society and industry.

MISSION OF THE DEPARTMENT

M1: To educate students to become excellent engineers in a confident and creative environment through world-class pedagogy.

M2: Enhancing the knowledge in the changing technology trends by giving hands-on experience through continuous education and by making them to organize & participate in various events.

M3: Impart skills in the field of IT and its related areas with a focus on developing the required competencies and virtues to meet the industry expectations.

M4: Ensure quality research and innovations to fulfill industry, government & social needs.

M5: Impart entrepreneurship and consultancy skills to students to develop self-sustaining life skills in multi-disciplinary areas.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Engage in professional practice to promote the development of innovative systems and optimized solutions for Computer Science and Engineering.

PEO2: Adapt to different roles and responsibilities in interdisciplinary working environment by respecting professionalism and ethical practices within organization and society at national and international level.

PEO3: Graduates will engage in life-long learning and professional development to acclimate the rapidly changing work environment and develop entrepreneurship skills

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. 2.Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Prepare students for industry by training them in cutting-edge technologies and core computing concepts, enabling them to develop efficient and effective computing mechanisms.

PSO2: Ability to Foster entrepreneurial activity, and develop professional, social, and effective communication skills.

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl. No	Semester	No. of Credits
1	1st Semester	20
2	2nd Semester	20
3	3rd Semester	21
4	4th Semester	21
5	5th Semester	22
6	6th Semester	22
7	7th Semester	20
8	8th Semester	14
	Total	**160**

PROPOSED UG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week					Credits
				Lecture	Tutorial	Practical	Project	Total (Hrs/week)	
				L	T	P	S		
1	BSC	MAT	MAT	3	0	0	0	3	3
2	IPCC-1	CSE	CSE	3	0	2	0	5	4
3	IPCC-2	CSE	CSE	3	0	2	0	5	4
4	PCC-1	CSE	CSE	3	0	0	0	3	3
5	PCC-2	CSE	CSE	3	0	0	0	3	3
6	PBL	CSE	CSE	0	0	2	2	4	2
7	AEC	CSE	CSE	0	0	2	0	2	1
8	SCR	CSE	CSE	0	0	2	0	2	1
9	NCMC	NSS / YOGA / PED							
10	AICTE Activity Points								
								Total	**21**

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 3rd & 4th Sem

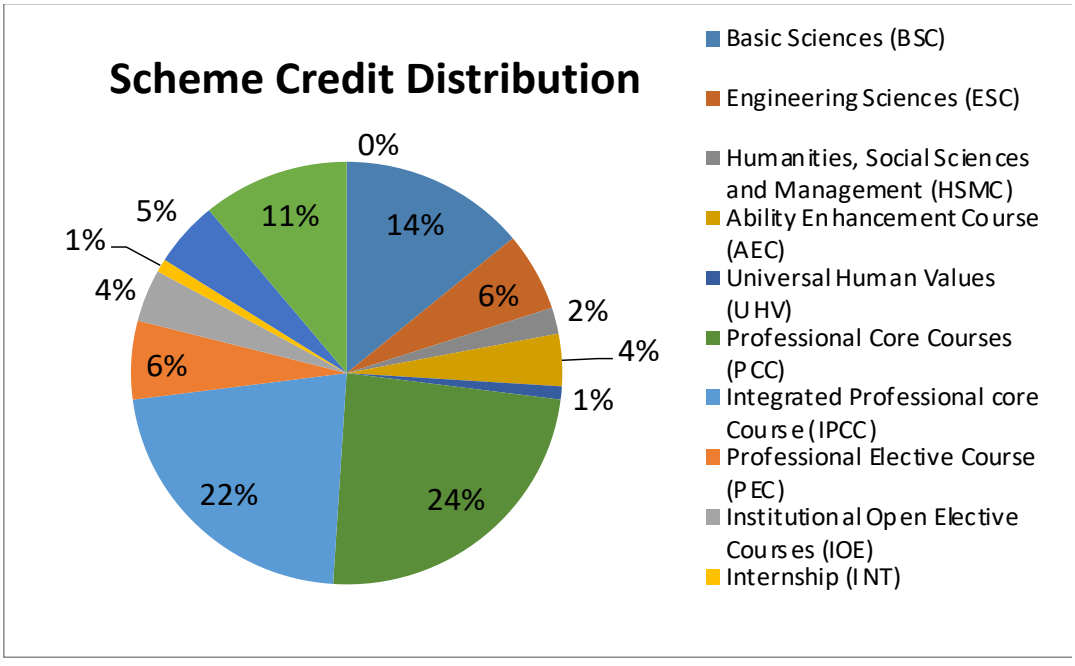
3rd Sem & 4th Sem

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	BSC	100%	--	--	--
2	IPCC-1	60%	40%	--	--
3	IPCC-2	60%	40%	--	--
4	PCC-1	100%	--	--	--
5	PCC-2	100%	--	--	--
6	PBL	--	100%	--	--
7	AEC	--	100%	--	--
8	SCR	--	--	100%	--
9	NCMC	--	--	--	100%
	Total Percentage	**53%**	**47%**	**13%**	**13%**

Scheme Distribution

Department of Computer Science & Engineering

Course Component	Credits	%of Credits
Basic Sciences (BSC)	22	14
Engineering Sciences (ESC)	9	6
Humanities, Social Sciences and Management (HSMC)	3	2
Ability Enhancement Course (AEC)	7	4
Universal Human Values (UHV)	2	1
Professional Core Courses (PCC)	39	24
Integrated Professional core Course (IPCC)	36	22
Professional Elective Course (PEC)	9	6
Institutional Open Elective Courses (IOE)	6	4
Internship (INT)	1	1
Project based Learning / Mini Project	8	5
Project Work (PW)	18	11
Non-credit Mandatory Courses (NCMC)	0	0
Total Credits	**160**	**100**



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

Course Category	Semester								Total Credits
	1st	2nd	3rd	4th	5th	6th	7th	8th	
Basic Sciences (BSC)	8	8	3	3	0	0	0	0	**22**
Engineering Sciences (ESC)	3	6	0	0	0	0	0	0	**9**
Humanities, Social Sciences and Management (HSMC)	1	2	0	0	0	0	0	0	**3**
Ability Enhancement Course (AEC)	2	1	1	1	0	0	0	2	**7**
Universal Human Values (UHV)	0	0	1	1	0	0	0	0	**2**
Professional Core Courses (PCC)	6	3	6	6	6	6	6	0	**39**
Integrated Professional core Course (IPCC)	0	0	8	8	8	8	4	0	**36**
Professional Elective Course (PEC)	0	0	0	0	6	3	0	0	**9**
Institutional Open Elective Courses (IOE)	0	0	0	0	0	3	3	0	**6**
Internship (INT)	0	0	0	0	0	0	1	0	**1**
Project based Learning / mini-Project	0	0	2	2	2	2	0	0	**8**
Project Work (PW)	0	0	0	0	0	0	6	12	**18**
Non-credit Mandatory Courses (NCMC)	0	0	0	0	0	0	0	0	**0**
Total Credits	**20**	**20**	**21**	**21**	**22**	**22**	**20**	**14**	**160**

Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25)

3rd SEMESTER: Computer Science & Engineering (CSE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BMATA301	Linear Algebra and Discrete Mathematics	BSC	MAT	MAT	3	0	0	0	3	3	3	50	50	100
2	BCS302	Data Structures and Applications	IPCC	CSE	CSE	3	0	2	0	5	4	3	50	50	100
3	BCS303	Digital Design and Computer Organization	IPCC	CSE	CSE	3	0	2	0	5	4	3	50	50	100
4	BCS304	Operating Systems	PCC	CSE	CSE	3	0	0	0	3	3	3	50	50	100
5	BCS305	Essentials of Digital Connectivity	PCC	CSE	CSE	3	0	0	0	3	3	3	50	50	100
6	BCS306	Java and J2EE Lab	PBL	CSE	CSE	0	0	2	2	4	2	2	50	50	100
7	BCS307	Python Programming Lab	AEC	CSE	CSE	0	0	2	0	2	1	2	50	50	100
8	BSCK308	Social Connect and Responsibility	SCR	HU	CSE	0	0	0	2	2	1	2	100	0	100
					Total	**15**	**0**	**8**	**4**	**27**	**21**	**21**	**450**	**350**	**800**

4th SEMESTER: Computer Science & Engineering (CSE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BMATA41	Statistics and Probability	BSC	MAT	MAT	3	0	0	0	3	3	3	50	50	100
2	BCS402	Design and Analysis of Algorithms	IPCC	CSE	CSE	3	0	2	0	5	4	3	50	50	100
3	BCS403	Database Management Systems	IPCC	CSE	CSE	3	0	2	0	5	4	3	50	50	100
4	BCS404	Industrial Internet of Things	PCC	CSE	CSE	3	0	0	0	3	3	3	50	50	100
5	BCS405	Unix Programming	PCC	CSE	CSE	3	0	0	0	3	3	3	50	50	100
6	BCS406	Full stack Development	PBL	CSE	CSE	0	0	2	2	4	2	2	50	50	100
7	BCS407	Programming with Git	AEC	CSE	CSE	0	0	2	0	2	1	2	50	50	100
8	BUHV 408	Universal Human Values	SCR	HU	CSE	1	0	0	0	1	1	2	50	50	100

Total	**16**	**0**	**8**	**2**	**26**	**21**	**21**	**400**	**400**	**800**

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non Credit Mandatory Course (NCMC) - National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Newly introduced subjects in the syllabus

		3rd Semester		4th Semester	
1.	**List of Existing Elective Courses**	1. BMATA301 2. BCS303 3. BCS304 4. BCS305 5. BSCK308	Mathematics III for Computer Science Digital Design and Computer Organization Operating System Essentials of Digital Connectivity Social Connect and Responsibility	1. BMATA401 2. BCS402 3. BCS403 4. BCS404 5. 23CSE48	Mathematics IV for Computer Science Design & Analysis of Algorithm Database Management Systems Unix programming Universal Human Values
2.	**List of New Existing Elective Courses**	1. BCS306	Java and J2EE Lab	1. 23CSE46 2. 23CSE47	Full Stack Development Programming with Git
3.	**List of New Industry Aligned Courses**	1. BCS302 2. BCS307	Data Structures and Applications Python Programming Lab	1. 23CSE44	Industrial Internet of Things

Percentage of Change in the Syllabus

3rd Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
1	**BMATA301**	Mathematics III for Computer Science	Statistics, Fundamentals of logic	Joint probability distribution, Markov chain	**40%**	Markov chain included in 4th Sem. JPD is not of much importance
2	**BCS303**	Digital Design and Computer Organization	1. Gate delays 2. Simulation and testing in logic circuits 3. PCI bus, SCSI bus and USB 4. Experiments to verify basic gates and universal gates 5. Experiment on shift registers 6. Experiments on De-Multiplexer 7. Experiments on PRESET and CLEAR	1. Basic concepts like VCC and ground, 2. Basic gates analysis 3. Circuit design. 4. Express the circuit using NAND and NOR gates. 5. In Computer Organization - architecture concepts are removed 6. Complex pipelining concepts are removed	**40%**	1. Simple concepts about the circuits and gates are removed as the students studied in first year 2. Complex part (like multilevel pipelining) of computer organization is removed as the basic concepts need to be introduced
3	**BCS304**	Operating System	Mass Storage Structures, Virtual Machines.	Storage Protection, Domain of Storage Protection.	**3.07%**	Usage of OS on Virtual Machines, and how to access and analyze Mass Storage Structure on RACKS and Servers.
4	**BCS305**	Essentials of Digital Connectivity	Socket Programming IPV4, IPV6	Multiple access protocols Channel allocation	**2%**	Modern Tool demonstration is included for better understanding

			NAT WIRESHARK Demonstration	Problem		

4th Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
1	**BMATA401**	Mathematics IV for Computer Science	Linear Algebra, Time series & Markov chain, Relations and functions, BFS & DFS Algorithms, sorting, weighted trees and prefix codes, Dijkstra's shortest path Algorithm, minimal spanning trees-The algorithms of Kruskal and Prim, Transport networks-Max-flow, Min-cut Theorem, Matching theory	Konigsberg Bridge problem, Utilities problem, electrical network problem, travelling salesman problem, directed graphs	**40%**	Topics prescribed by VTU removed which is of less importance to students
2	**BCS402**	Design and Analysis of Algorithms	• Naive String Matching • Boyer-Moore algorithm • Nondeterministic algorithms	• Performance Analysis: Estimating Space complexity and Time complexity of algorithms. • Graph coloring, Hamiltonian cycles Problems.	**4%**	Naive String Matching, Boyer-Moore algorithm are the most sort out string matching algorithms and non-deterministic algorithms acts as basics for ATC Repetition of concepts as it is covered in Graph Theory

3	**BCS403**	Database Management Systems	• Web Database Programming Using PHP • Database Security • Added 4 extra Lab Programs	• NoSQL Databases and Big Data Storage Systems • Lab Program on NoSQL	**40%**	• Web Database Programming Using PHP will help students to carry out the mini project by integrating Front End with the database. • Database Security chapter will help students understand how to secure the database • Removed NoSQL. Because it can be added as AEC course.
4	**BCS404**	Unix Programming	File APIs, UNIX Processes and Process Control, Overview of IPC Methods, Sockets	Introduction to UNIX System process	**40%**	• Unix system programming APIs are very important for CSE students as it serves as foundational knowledge to portability and stands in Unix Operating Systems. • Understanding Unix system programming is essential for developing networked applications

3rd SEMESTER

BASIC SCIENCE COURSE(BSC)

Semester	**:**	**3**				
Course Title	**:**	**Linear Algebra and Discrete Mathematics**				
Course Code	**:**	**BMATA301**				
Course Type (Theory/Practical/Integrated)	**:**	**Theory**				
Category	**:**	**BSC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L: T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding Engineering problems
2	Use concepts of linear algebra and discrete mathematics in solving problems
3	Analyze problems using concepts of linear algebra and discrete mathematics
4	Use MATLAB to obtain solutions of various mathematical problems

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Matrix Theory** Elementary transformations on a matrix, echelon form & rank of a matrix, consistency of system of linear equations, Gauss elimination, Gauss – Seidel method to solve system of linear equations. eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix, diagonalization of matrices	**8**
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
2	**Vector Spaces** Introduction to vector spaces, subspaces, linear combination, linear span, linear dependence and independence, basis and dimension, linear mappings, Rank-Nullity theorem	**8**
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
3	**Linear Transformation and Inner Product Spaces** Matrix representation of linear transformations, singular and non-singular linear transformations, invertible linear transformations, inner products, inner product spaces, length and orthogonality, orthogonal sets and bases, projections, Gram-Schmidt process	**8**
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
4	**Fundamentals of logic** Basic connectives and truth tables, logical equivalence-laws of logic, predicates, quantifiers, logical equivalence involving quantifiers, logical implication-rules of inference, proofs of theorems	**8**
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
5	**Relations and functions** Cartesian products and relations, properties, computer recognitions-zero-one matrices, partial orders, equivalence relations, partitions, Hasse diagrams. Functions: one-one and onto functions, composition of functions and invertible functions.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
	NIL	

Textbooks	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Linear Algebra and its applications, David C. Lay, Steven R. Lay, Judi J Mc. Donald Pearson Education, 6th Edition, 2021.
2	Theory and problems of linear algebra, Seymour Lipschutz, Marc Lipso, Schaum's outline series, McGraw-Hill Education, 6th edition, 2017.
3	Discrete Mathematics and its Applications, Kenneth H Rosen, McGraw Hill publications, 7th edition.
Reference Books	
1	Advanced Engineering Mathematics, Erwin Kreyzig, Wiley Publications, 10th Edition, 2018.
2	Higher Engineering Mathematics, B. S. Grewal, Khanna publishers, 44th Edition, 2021
3	Linear Algebra: An Introduction, Richard Bronson & Gabriel B. Costa, Academic Press, 2nd edition, 2014
4	Discrete Mathematics, J.K Sharma, MacMilan Publishers India, 3rd Edition, 2011.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the basic concepts of Linear Algebra and Discrete Mathematics	**R/U**	**L1/L2**
CO2	Apply techniques of Linear Algebra and Discrete Mathematics to solve Engineering Problems	**AP**	**L3**
CO3	Analyze Engineering problems using Linear Algebra and Discrete Mathematics	**AN**	**L4**
CO4	Develop mathematical solutions to various real time problems using MATLAB	**E**	**L5**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3													
CO3		1												
CO4			2		2				1	1				

Weblinks and Video Lectures (e-Resources)
https://youtu.be/9h_Q-R6sXbM?si=PGTNmtJNzEWxQOQS
https://youtu.be/9MCjyQSRmR8?si=fToiea0CcJxnH7kz
https://youtu.be/oaOm2pnKkyY?si=HonXdjTwda_9lBL3
https://youtu.be/Lj9Awpd5ltc?si=qeviX5wRiQxiWCEL

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember			30		
Understand	10	10	20		
Apply	30	30			
Analyze	10	10			
Evaluate	-	-		50	
Create	-	-			

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	2.5	2.5	5	10	30	20%
CO2	15	15	7.5	7.5	15	30	90	60%
CO3	5	5	2.5	2.5	5	10	30	20%
CO4								
CO5								
Total	25	25	25	25	25	50	150	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	5
Apply	35
Analyze	10
Evaluate	--
Create	--

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5						5	10%
CO2	5	5	5	5	5	10	35	70%
CO3		5			5		10	20%
CO4								-
CO5								-
Total	10	10	5	5	10	10	50	100%

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs.
Practical's	8 -10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 40% of the maximum marks (20 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment (CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student must secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills (HOTS).

Continuous Internal Evaluation (CIE) for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated, and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.

  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student must secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- The question paper shall be set for 100 Marks. The medium of the question paper shall be

in English. **The duration of SEE is 03 hours.**

- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students must answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be (CCA1+CCA2)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/ Poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method for implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**15**	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	**10**	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives/ Activity based learning		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
					Total CIE Practical		**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Semester	**:**	**3**				
Course Title	**:**	**Data Structures and Applications**				
Course Code	**:**	**BCS302**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Explain the fundamentals of data structures and Algorithms, their applications essential for implementing solutions to problems.
2	Illustrate representation of data structures and Algorithms for real world applications.
3	Study the given application and figure the appropriate data structures and Algorithm to be used.
4	Develop the correct data structure to build solutions for the real world applications
5	List the different types of data structures and Algorithm Techniques available.
6	Write programs for different problems statements

Teaching-Learning Process
Pedagogical Initiatives:
Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**INTRODUCTION TO DATA STRUCTURES:** Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations, Review of Arrays: Representation of Linear Arrays and Multidimensional Arrays, Review of pointers and dynamic Memory Allocation, **STACKS:** Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Different representation of expression.	8
Pedagogy	**Demonstration and Practical Based Learning**	
2	**STACKS**: Stack Applications: Infix to postfix conversion, Infix to prefix conversion, evaluation of postfix expression, recursion **QUEUES:** Definition, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays, Dequeues, Priority Queues.	8
Pedagogy	**Demonstration, Presentation and Practical Based Learning**	
3	**LINKED LISTS:** Definition, classification of linked lists. Representation of different types of linked lists in Memory, Traversing, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists –Sparse matrix representation.	8
Pedagogy	**Demonstration, Presentation, Practical Based Learning and collaborative learning**	
4	**TREES 1:** Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree. Application of Trees-Evaluation of Expression.	8
Pedagogy	**Demonstration, Presentation, Practical Based Learning, collaborative learning and Case Study**	
5	**TREES 2:** AVL tree, Red-black tree, Splay tree, B-tree. **GRAPHS:** The Graph Abstract Data Types, Elementary Graph Operations **HASHING:** Introduction, Hash Table organizations, Static Hashing, Dynamic Hashing	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications.	

	• **Demonstration:** exhibits the implementation process.

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Design and implement a C program that helps a meteorological department analyse temperature data over a month. The program should perform the following tasks using arrays **Input Temperature Data:** • Create an array to store the daily temperatures (in degrees Celsius) for 30 days. • Allow the user to input the temperature for each day. **Calculate Average Temperature:** • Calculate and display the average temperature for the month. **Find Maximum and Minimum Temperatures:** • Identify and display the highest and lowest temperatures recorded during the month. • Also, display the days on which these temperatures occurred. **Days Above Average Temperature:** • Count and display the number of days on which the temperature was above the monthly average. **Expected Outcome:** The program should allow the user to input 30 temperatures, then perform the analysis and display the results in a clear and organized manner	**CO6**
2	Design and implement a C program to help a library manage its book collection. The program should perform the following tasks using arrays: **Store Book Information:** • Create an array to store the titles of books available in the library. • Allow the user to input up to 100 book titles. **Search for a Book:** • Allow the user to search for a book by its title. • Display a message indicating whether the book is available in the library. **Display All Books:** • Display a list of all book titles currently stored in the library. **Remove a Book:** • Allow the user to remove a book from the library by entering its title. • Update the array accordingly and display the updated list of books. **Expected Outcome:** The program should allow the user to manage the library's book collection by adding, searching, displaying, and removing books. All operations should be performed using arrays, ensuring efficient data management.	**CO6**
3	Design and implement a C program to simulate the navigation functionality of a web browser using stacks. The program should allow the user to: **Visit a New Website:** • Each time the user visits a new website, store the URL in a stack representing the "Back" history. • Clear the "Forward" history stack when a new website is visited. **Go Back to the Previous Website:**	**CO6**

	• When the user selects "Back," pop the URL from the "Back" stack and push it onto the "Forward" stack. • Display the URL of the previous website. **Go Forward to the Next Website:** • When the user selects "Forward," pop the URL from the "Forward" stack and push it onto the "Back" stack. • Display the URL of the next website. **Display Current Website:** • Display the URL of the current website the user is viewing. **Expected Outcome:** The program should allow the user to navigate through websites using "Back" and "Forward" operations, just like in a real web browser. The stacks should correctly manage the history, ensuring accurate navigation.	
4	Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ Solving Tower of Hanoi problem with n disks	**CO6**
5	Design and implement a C program to manage a list of patients in a hospital using a singly linked list. The program should support the following functionalities: **Add a New Patient:** • Each patient has a unique ID, name, and age. • Allow the user to add a new patient at the end of the list. **Display All Patients:** • Display the details (ID, name, age) of all patients currently in the list. **Search for a Patient by ID:** • Allow the user to search for a patient by their unique ID and display their details if found. **Delete a Patient Record:** • Allow the user to delete a patient record by their ID. • Ensure that the linked list is updated correctly after deletion. **Count Total Number of Patients:** • Display the total number of patients currently in the system. **Expected Outcome:** The program should allow the user to effectively manage a list of patients, adding new entries, displaying all records, searching for specific patients, deleting records, and counting the total number of patients.	**CO6**
6	Design a C program to perform the addition of two polynomials (2 variable polynomial) using a doubly linked list. The program should be able to handle polynomials with both positive and negative coefficients.	**CO6**
7	Given an array of elements, construct a complete binary tree from this array in level order fashion. That is, elements from left in the array will be filled in the tree level wise starting from level 0. Ex: Input : arr[] = {1, 2, 3, 4, 5, 6}	**CO6**
8	Write a C program to manage student records using a Binary Search Tree (BST). Each student record should include a unique roll number, name, and GPA. The BST should be organized by the roll number, which will be used as the key. **Operations to Implement:** **Insert Record:** Insert a new student record into the BST. Ensure that roll numbers	**CO6**

	are unique. **Search Record:** Search for a student record by roll number. If found, display the student's name and GPA. **Delete Record:** Delete a student record by roll number. Ensure that the BST properties are maintained after deletion. **In-order Traversal:** Display all student records in ascending order of roll numbers (in-order traversal). Display Students with GPA Above a Certain Threshold: Implement a function to display all students whose GPA is above a user-defined threshold.	
9	Write a C program to manage course prerequisites in a university using a Directed Acyclic Graph (DAG). Each course is represented as a node, and a directed edge from course A to course B indicates that course A is a prerequisite for course B. **Operations to Implement:** **Add Course:** Add a new course (node) to the graph. **Add Prerequisite:** Create a prerequisite relationship (directed edge) between two courses. **Remove Prerequisite:** Remove an existing prerequisite relationship between two courses. **Display Courses and Their Prerequisites:** Display all courses and their direct prerequisites. **Topological Sorting:** Implement a function to determine the order in which courses should be taken based on their prerequisites using topological sorting. **Check for Cycles:** Implement a function to check if the graph has any cycles (i.e., a circular dependency between courses) since the graph must remain acyclic	**CO6**
10	Design and develop a program in C that uses Hash Function H:K->L as H(K)=K mod m(reminder method) and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.	**CO6**
Open ended Programs		
1	Develop a project to demonstrate the usage of any Data structures	**CO6**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014
Reference Books	
1	Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.
2	Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.
3	Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
4	Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
5	A M Tenenbaum, Data Structures using C, PHI, 1989

6	Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Define, Understand and Explain the concepts of Data Structures and Algorithms	**U**	**L1/L2**
CO2	Apply the concepts of Data Structures and Algorithm technique for a given problem.	**Ap**	**L3**
CO3	Analyze the given problem and use appropriate Data Structure like stack, queue, linked lists, trees and hashing tables	**An**	**L4**
CO4	Design solution for given problem using appropriate Data Structures and Algorithm Technique.	**C**	**L6**
CO5	Investigate various Data Structures and algorithm techniques available in the literature and submit the report	**E**	**L5**
CO6	Conduct experiments on Data Structures using modern IDE	**Ap**	**L3**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	2													
CO3		2												
CO4			3						3	2				
CO5				2					2					
CO6					3			3				2	2	

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc19_cs40/preview
2	https://www.geeksforgeeks.org/what-is-data-structure-types-classifications-and-applications/
3	https://www.javatpoint.com/data-structure-introduction
4	https://www.mygreatlearning.com/blog/data-structure-tutorial-for-beginners/
5	https://www.coursera.org/specializations/data-structures-algorithms

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	20	20			
Understand	20	10	10		10
Apply	10	20	10		10
Analyse	-	10	10		10
Evaluate	-	-		10	10

Create	-	-		10	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	5		5	10	40	26.5%
CO2	10	10	5		5	10	40	26.5%
CO3	5	5		10	10	20	50	35%
CO4				5	5	10	20	14%
CO5								
Total	25	25	10	15	25	50		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%+2%
Understand	20%+2%
Apply	40%+4%
Analyse	20%+2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2		10	5	5	10	10	40	40%
CO3					10	10	20	20%
CO4								-
CO5								-
Total	20	20	10	10	20	20	100	100%

Semester	**:**	**3**				
Course Title	**:**	**Digital Design and Computer Organization**				
Course Code	**:**	**BCS303**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**IPCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40+20**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To understand standard forms and various methods of simplification of Boolean expression.
2	To understand combinational and sequential circuit operations.
3	To realize the basic structure of computer system
4	To illustrate the working of I/O operations and processing unit
5	To familiarize with fundamental computer architecture

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve
- **Teaching-Learning Process (TLP).**

DSATM

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COURSE CURRICULUM

Module No.	Topics	Hours
1	Boolean Analysis of Logic Circuits, Logic Simplification Using Boolean Algebra, Standard Forms of Boolean Expressions, The Karnaugh Map SOP Minimization, The Quine-McCluskey Method, Combinational Logic Using NAND and NOR Gates, Adders-Full adder, 4-bit parallel adder, Ripple Carry and Look-Ahead Carry Adders. Textbook 1: Chapter 4 (4.4-4.6,4.9,4.11,5.4,6.2,6.3-.excluding VHDL implementation and applications)	**8**
Pedagogy	**Seminar/problem solving/chalk and Talk**	
2	Decoders- The Basic Binary Decoder, The 4-Bit Decoder, Encoders- The Decimal-to-BCD Encoder, Code Converters- BCD-to-Binary Conversion, Binary-to-Gray and Gray-to-Binary Conversion, Multiplexers (Data Selectors), Demultiplexers Sequential Logic: Latches- The S-R (SET-RESET) Latch, The Gated D Latch, Flip-Flops- The D Flip-Flop, The J-K Flip-Flop, Edge-Triggered Operation D Flip-Flop. Textbook 1: Chapter 6 & 7: (6.5,6.6,6.7,6.8,6.9,7.1,7.2- excluding implementation and applications)	**8**
Pedagogy	**Group discussion/chalk and talk/PowerPoint presentation**	
3	Basic Structure of Computers: Functional Units, Basic Operational Concepts, Bus structure, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instruction and Instruction sequencing, Addressing Modes, Assembly Language Text book 2: 1.2, 1.3, 1.4, 1.6, 2.2, 2.3, 2.4, 2.5	**8**
Pedagogy	**Chalk and talk/Video demonstration/ PowerPoint presentation**	
4	Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access: Bus Arbitration, Speed, size and Cost of memory systems. Cache Memories – Mapping Functions. Text book 2: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4, 5.4, 5.5.1**Text Book2: chapter1,2**	**8**
Pedagogy	**Chalk/talk/PowerPoint presentation**	
5	Basic Processing Unit: Some Fundamental Concepts: Register Transfers, Performing ALU operations, fetching a word from Memory, Storing a word in memory. Execution of a Complete Instruction. Pipelining: Basic concepts, Role of Cache memory, Pipeline Performance. Text book 2: 7.1, 7.2, 8.1	**8**

	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Given a 4-variable logic expression, simplify it using k-map **simulate** the same using basic gates and universal gates.	**CO2**
2	**Design and simulate** a 4 bit full adder and subtractor circuit using basic gates.	**CO2**
3	**Design and simulate** a Hexa decimal up/down counter using suitable IC and Seven segment display.	**CO2**
4	Design **Verilog program** for simple calculator to perform basic Arithmatic and Logical operations (data flow model).	**CO2**
5	Design **Verilog program** to implement simple digital circuits using structural, Data flow and Behavioural model.	**CO2**
6	Design **Verilog program** to implement 4:1 and 8:1multiplexers using behavioural model.	**CO2**
7	Design **Verilog program** for implementing various types of Flip-Flops such as SR, JK and D.	**CO2**
8	Write **Verilog program** for 4-bit BCD synchronous up/down counter.	**CO2**
9	Realize MUX and DEMUX using only NAND Gates on a **digital trainer kit.**	**CO2**
10	Realize Half adder, full adder and full subtractor circuits using only NAND gates on a **digital trainer kit**.	**CO2**
	Open ended Programs	
1	Design and simulate a simple voting system that can be used to simultaneously provide the number of “yes” votes and the number of “no” votes using full-adder and parallel adder circuits.	**CO2**
2	Design a Verilog program for simple elevator circuit using digital circuits and show up/down movement.	**CO2**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Thomas L. Floyd "Digital Fundamentals" 11th Edition by Pearson 2015
2	Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5 th Edition, Tata McGraw Hill.
Reference Books	
1	M. Morris Mano & Michael D. Ciletti, Digital Design With an Introduction to Verilog Design, 5e, Pearson Education.
2	William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Describe the fundamental aspects of digital logic and basic computer architecture.	**REMEMBER/ UNDERSTAND**	**L2**
CO2	Apply the concepts of digital logic for various combinational and sequential circuits.	**APPLY**	**L3**
CO3	Analyze Basic Computer Architecture and Instruction Set Architecture	**ANALYZE**	**L4**
CO4	Analyze internal Organization of computer architecture and describe the processor Performance.	**ANALYZE**	**L4**
CO5	Realize or Simulate digital circuits using suitable hardware or software platform.	**ANALYZE**	**L4**
CO6	Design, execute or realize different types of combinational and sequential circuits using Verilog.	**ANALYZE**	**L4**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3												2	
CO3		2											2	
CO4		2											2	
CO5		3											2	
CO6			2							1		1	2	

Weblinks and Video Lectures (e-Resources)	
1	Digital Electronic Circuits - Course (nptel.ac.in)
2	Free Course: Dgital Electronic Circuits from Indian Institute of Technology, Kharagpur | Class Central
3	'Computer Organization' Video Lectures from IIT Madras by Prof. S. Raman - Computer Science and Engineering NPTEL Video Lectures (nptelvideos.com)

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	20	25			
Understand	20	25			
Apply	10	25			
Analyse	-	15			
Evaluate	-	-			
Create	-	-			

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	5	2.5	2.5	-	-	20	20%
CO2	-	5	2.5	2.5	5	5	20	20%
CO3	-	-	-	-	5	5	10	10%
CO4	5	5	2.5	2.5	5	5	25	25%
CO5	5	5	2.5	2.5	5	5	25	25%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%
Understand	20%+2%
Apply	40%+6%
Analyse	20%+2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2		10	5	5	10	10	40	40%
CO3					10	10	20	20%
CO4								-
CO5								-
Total	20	20	10	10	20	20	100	100%

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 40% of the maximum marks (20 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods

of assessment.

- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students must answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

Semester	**:**	**3**				
Course Title	**:**	**Operating Systems**				
Course Code	**:**	**BCS304**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**PCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn How Operating System is Important for Computer System.
2	To make aware of different types of Operating System and their services.
3	To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
4	To know virtual memory concepts.
5	To learn secondary memory management.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal-solutions
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction:** What Operating Systems Do? Computer-System Architecture, Operating System Structure, Operating system operations. **System Structures:** Operating system services, User and Operating system interface, System Calls, Types of System calls, System programs, Operating System Structure. **Process Concept:** Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication.	8
Pedagogy	**Role play on system calls**	
2	**Multithreaded Programming:** Overview, Multi-core Programming, Multithreading Models, Implicit Threading, Threading Issues. **Process Scheduling:** Basic concepts, Scheduling Criteria, Scheduling Algorithms. Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.	8
Pedagogy	**Demonstration of Scheduling Algorithms**	
3	**Synchronization:** Background, Critical Section Problem, Mutex locks, Semaphores, Classic Problems of Synchronization. **Deadlocks:** System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery from deadlock.	8
Pedagogy	**Presentation**	
4	**Memory management strategies:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table. **Virtual Memory Management:** Background, Demand paging, copy on write, Page replacement algorithms, Allocation of frames, Thrashing.	8
Pedagogy	**Poster Presentation**	
5	**Implementing File-system:** File-System Structure, File-System Implementation, Directory Implementation, Allocation methods, Free-space management.	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Textbooks

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Operating System Concepts, by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 10th Edition, Wiley India, 2018.
2	Operating Systems, A Concept-Based Approach, by DM Dhamdhere, 3rd Edition, Tata McGraw-Hill, 2012.
Reference Books	
1	Operating Systems, A Concept-Based Approach, by DM Dhamdhere, 3rd Edition, Tata McGraw-Hill, 2012.
2	Modern Operating Systems, by Andrew S. Tanenbaum and Herbert Bos, 4th Edition, Pearson, 2015.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the basic concepts of operating system structures, services and functionalities.	L2	U
CO2	Apply various concepts to solve problems related to synchronization, deadlocks, memory management, in Operating Systems.	L3	AP
CO3	Analyze different algorithms of CPU scheduling, Page replacement, storage management and disk scheduling	L4	AN
CO4	Demonstrate the different functionalities of Operating System.	L4	AN
CO5	Select appropriate algorithms for the given CPU processes, deadlock occurrences and memory management.	L4	AN

Mapping of Course Outcomes to Program Outcomes:

CO1	3													
CO2		3												
CO3			2											
CO4				3									3	3
CO5				3									3	3

Weblinks and Video Lectures (e-Resources)	
1	http://faculty.salina.k-state.edu/tim/ossg/
2	https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/index.html
3	http://www.naturligtraw.com/schaum-s-outline-ofoperating-systems.pdf
4	https://www.coursera.org/lecture/technical-support-fundamentals/moduleintroduction-I3n9l

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	20	10		
Understand	20	10	10	
Apply	10	20	10	
Analyse		10	10	
Evaluate				10
Create				10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	2.5	2.5	5	10	40	26.5%
CO2	10	10	2.5	2.5	5	10	40	26.5%
CO3	5	5	5	5	10	20	50	35%
CO4			2.5	2.5	5	10	20	14%
CO5					--	--	--	--
Total	25	25	12.5	12.5	25	50		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10% + 2%
Understand	20% + 2%
Apply	40% + 4%
Analyse	20% + 2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2	--	10	5	5	10	10	40	40%
CO3	--	--	--	--	10	10	20	20%
CO4	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--
Total	20	20	10	10	20	20	100	100%

Semester	**:**	**3**				
Course Title	**:**	**ESSENTIALS OF DIGITAL CONNECTIVITY**				
Course Code	**:**	**BCS305**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**PCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn the basics of data communication networks and components.
2	To learn different layers of networks and protocols used in those layers.
3	To learn network requirements used for communication.
4	To learn to handle networking challenges by using different concepts
5	To learn the different approaches used for networking

Teaching-Learning Process
Pedagogical Initiatives:
Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal-solutions
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Basics of Networking**: Data Communication, Networks, Protocols, OSI Model, TCP/IP Protocol suite. **Application Layer:** Principles of Network Applications: Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols. The Web and HTTP: Overview of HTTP, Non-persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching. **T2: Ch 1: 1.1,1.2,1.4 Ch 2: 2.1-2.4, T1: Ch:2**	**8**
Pedagogy	**Demonstration, Think Pair and Share**	
2	**Application Layer:** DNS; The Internet\'s Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages, Socket Programming: creating Network Applications: Socket Programming with UDP, Socket Programming with TCP. **Transport Layer 1: Introduction** and Transport-Layer Services: Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing: Connectionless Transport: UDP, UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective repeat. **T1: Ch:2, T3: Ch 11, T1: Ch 3**.	**8**
Pedagogy	**Demonstration, Poster Presentation**	
3	**Transport Layer 2:** Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control: The Causes and the Costs of Congestion, Approaches to Congestion Control, TCP Congestion Control. **The Network layer:** What's Inside a Router?: Input Processing, Switching, Output Processing, The Internet Protocol (IP): IPv4, Addressing, IPv6, and More IPv4 Datagram Format IPv4 Datagram Fragmentation IPv4 Addressing Network Address Translation (NAT) ,IPv6. **T1:Ch 3,Ch 4: 4.2,4.3**	**8**
Pedagogy	**Demonstration, Discussion**	
4	**Routing Algorithms:** The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Intra-AS Routing in the Internet: OSPF, Routing Among the ISPs: BGP, The Role of BGP ,Advertising BGP Route Information ,Determining the Best Routes, ICMP: The Internet Control Message Protocol. **Network Management and SNMP**: The Network Management Framework, The Simple Network Management Protocol (SNMP). **T1:Ch 5: 5.2,5.4,5.6,5.7**	**8**
Pedagogy	**Problem Solving, Think Pair and Share**	

5	**Link Layer:** Introduction to the Link Layer, The Services Provided by the Link Layer, Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC), Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet. **Physical Layer:** Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate limits, Performance. **T1:Ch 6: 6.1,6.2,6.4,T2: Ch 3**	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another. • **Problem Solving**: encourages cognitive thinking and enables creative problem solving. • **Poster Presentation:** allows students to represent the concepts visually to understand the topics easily. • **Case studies:** maps different domains in real time applications. • **Demonstration:** exhibits the implementation process.	

Textbooks	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Seventh edition, Pearson,2017 .
2	Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition
Reference Books	
1	Larry L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER.
2	Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Define** and **understand** the fundamentals of network communication and associated, hardware and software components	**U**	**L1/L2**
CO2	**Identify** various layers of networking and its protocols	**Ap**	**L3**
CO3	**Analyze** the concepts of communication networks	**An**	**L4**
CO4	**Evaluate** different networking concepts, its challenges.	**E**	**L5**
CO5	**Design** a network based on the requirements using modern tools	**C**	**L6**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3													
CO3		3												
CO4			3	2										
CO5					5									

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc25_cs15/preview
2	https://www.coursera.org/learn/illinois-tech-computer-networking
3	https://www.netacad.com/launch?id=f393c38f-b410-4d2b-8275-70e144273519&tab=curriculum&view=7b510724-59bc-528f-a7fa-a5067cb672c2

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	15	10		
Apply	15	20		
Analyse	10	10		
Evaluate			25	25
Create			25	25

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	5	5	10	5	45	45%
CO2	5	5	5	5	5	10	35	35%
CO3		5	5		5	5	20	20%
CO4								
CO5						--	--	
Total	15	20	15	10	20	20		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10% + 2%
Understand	20% + 2%
Apply	40% + 4%
Analyse	20% + 2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	5	5	10	10	50	50%
CO2	5	5	5	5	5	5	30	30%
CO3	--	--	5	5	10	--	20	20%
CO4	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--
Total	15	15	15	15	25	15	100	100%

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:2:2
Total Hours of Pedagogy	25 hours – Theory + Project
Credits:	02
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		**SEE**	
	Project Weekly Assessment		**Final Project Evaluation**	
Project	**Project Understanding**	05 Marks	**Write up**	10 Marks
	Technical Competence	10 Marks	**Presentation & Demonstration**	50 Marks
	Innovation	10 Marks	**Project report**	25 Marks
	Problem Solving	15 Marks	**Viva-Voce**	15 Marks
	Project Demonstration	10 Marks	**Total**	**100 Marks**
Total		**50 Marks**	**100 Marks Reduced to 50 Marks**	

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centred lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centred.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
- Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.

- Encourages the mastery of technological tools, thus preparing them for the workforce.
- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.
  Level 1- 2nd Year – 3rd Semester & 4th Semester
  Level 2- 3rd year – 5th Semester & 6th Semester
  Level 3 – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2**.** During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

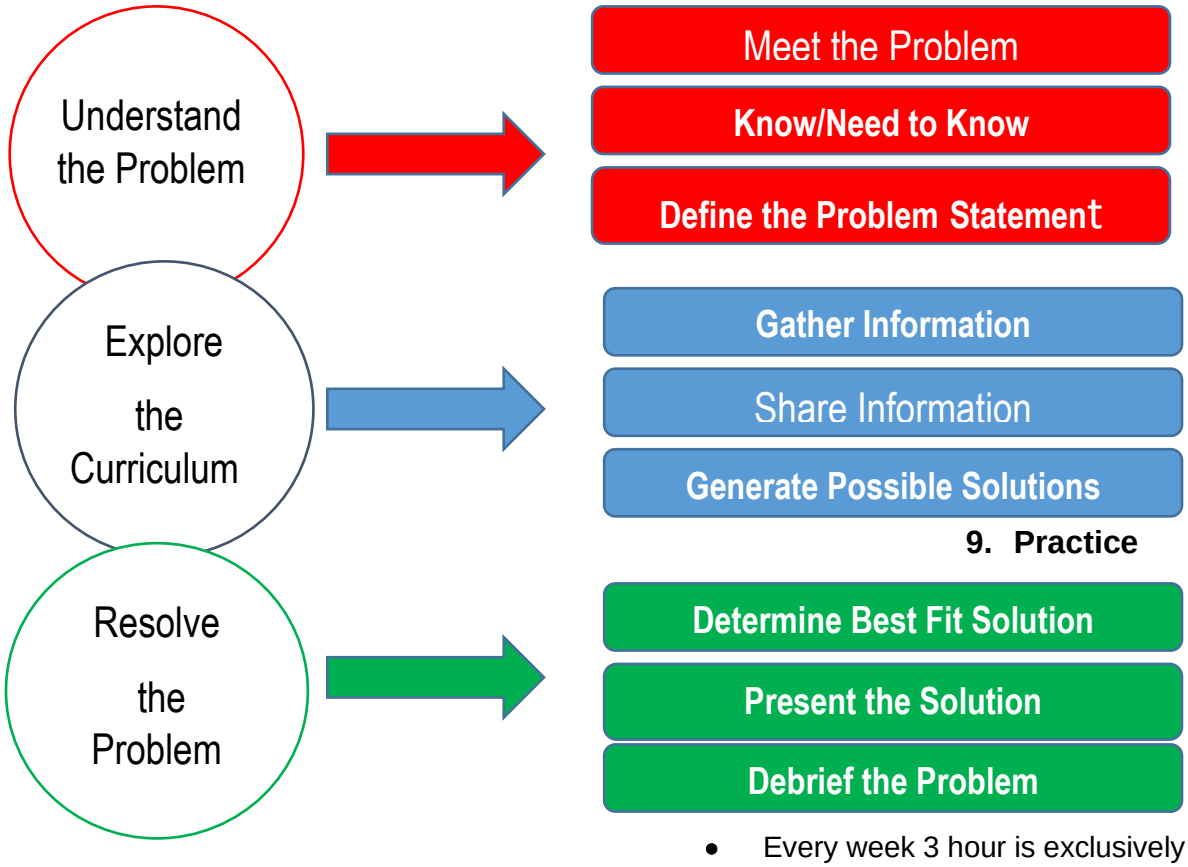
1. Phase 2 is for 11 Weeks

2**.** During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

1. Phase 1 – 25 Marks
2. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively

- dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally-meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

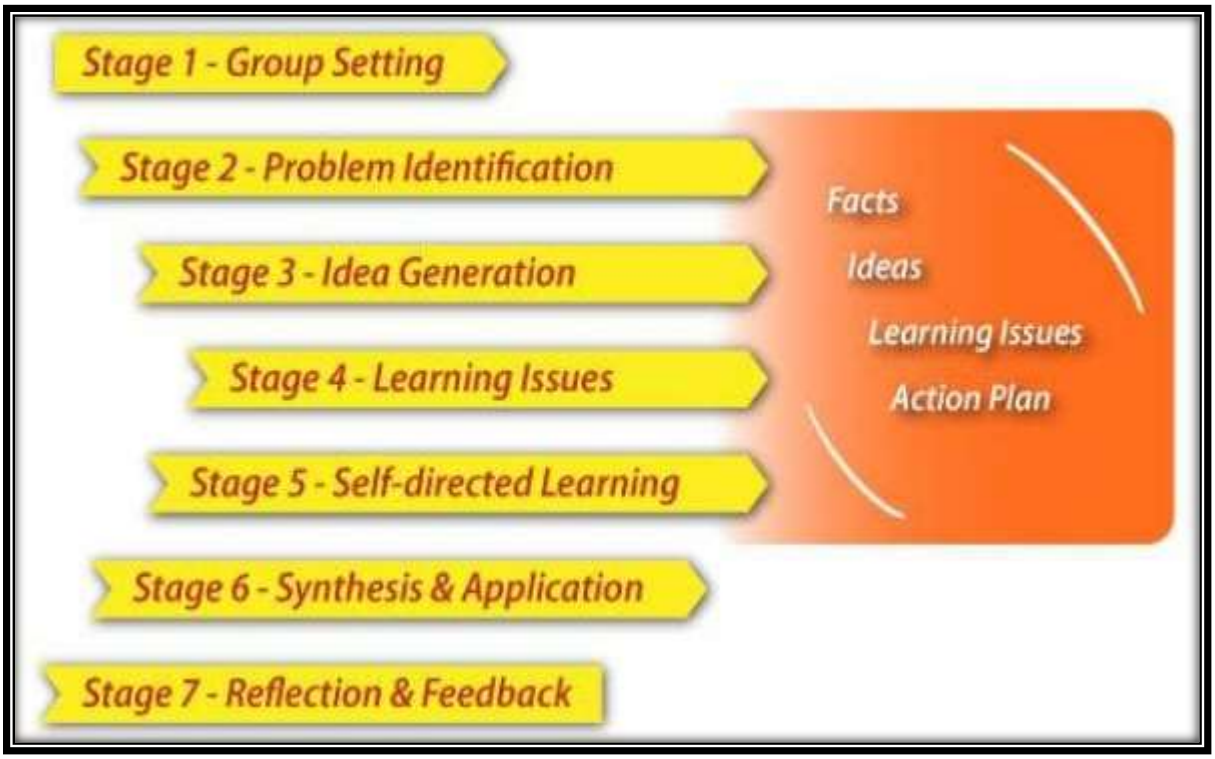
10. Obstacles/Gaps

- Lack of student's interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

Sl.No	Topics	Duration
Phase-1		
1.	Understanding of the project and preparing a project plan	**3 Weeks**
2.	Literature review	**1 Week**
3.	Planning	**1 Week**
Phase-2		
4.	Analysis and Design	**3 Weeks**
5.	Implementation	**6 Weeks**
6.	Testing	**1 Week**
7.	Writing the project report	**1 Week**
	Total	**16 Weeks**

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review

5. Methodology
6. Analysis and Design
7. Implementation
8. Testing
9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page
2. Certificate
3. Declaration
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25″, Right – 1″, Top and Bottom – 0.75″.

- The total number of reports to be prepared are
    - One copy to the department.
    - One copy to the concerned guide
    - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

Score Levels	Content	Conventions	Organization	Presentation
5	▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate	▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice	▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution.	▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out.
4	▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate	▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice	▪ Information supports the solution to the challenge or question.	▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources	▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice	▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently carried out	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention. ▪ Presentation is loosely

2	▪ Provides inconsistent information for solution ▪ Has no apparent application of critical thinking ▪ Has no clear goal ▪ Is pulled from few sources ▪ Has significant factual errors, misconceptions, or misinterpretations	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	3
Subject Identified for PBL	Java and J2EE Lab
Prerequisite	Concepts of Object-Oriented Programming paradigm
Justification for the selected subject	• JAVA is a very versatile and is used for programming applications on the web, mobile, desktop etc. • Java is Platform Independent and hence widely used in industry. • Innovative products and digital services designed for the future continue to rely on JAVA. • World's largest companies use JAVA for machine critical applications. • Knowledge of JAVA opens various career paths, including • software development, system architecture DevOps etc. • Emerging technologies like AI and IOT are using JAVA as a foundation.

List of possible projects	• Email Client software • Online Banking • Health Administration • Chat application • Criminal Face detection System • Game Development • Car rental APP • Online Book store • Ticket Booking

Signature of the Guide **Signature of HOD**

Semester	**:**	**3**				
Course Title	**:**	**Java and J2EE Lab**				
Course Code	**:**	**BCS306**				
Course Type (Theory/ Practical/Integrated)	**:**	**Practical & Project**				
Category	**:**	**PBL**				
Stream	**:**	**CSE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:2**		**SEE**	**:**	**50**
Total Hours	**:**	**24**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Equip students with a solid understanding of object-oriented programming concepts, including classes, objects, inheritance, and exception handling, to develop robust and maintainable Java applications.
2	Provide hands-on experience with advanced Java technologies and frameworks such as Struts and Spring, along with networking and file I/O operations, to prepare students for real-world software development challenges.
3	Develop students' abilities to implement key operating system concepts like round-robin scheduling and inter-process communication using FIFO pipes, enhancing their competence in system-level programming and Unix shell scripting.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions. Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Student Information Management System (OOP & Exception Handling)** **Objective:** Build a comprehensive system for managing student information, focusing on object-oriented principles and exception handling. **Description:** • **Classes and Inheritance:** Create a Person class with properties like name and age, and extend it to a Student class that adds properties like studentID and course. • **File I/O:** Implement a feature to read student data from a file and write updated information to another file. • **Exception Handling:** Add robust error handling for common issues like file not found, invalid data formats (e.g., catching NumberFormatException for invalid input), and ensure the system continues functioning smoothly after an exception. **Generics and Collections:** Use generics to store and manage different data types such as Integer (for student IDs) and String (for names). Implement a collection class to store and manage student information (e.g., ArrayList or HashMap).	2
Pedagogy	Modeling	
2	**Digital Library Management System (Data Structures & File I/O)** **Objective:** Create a system to manage a digital library where users can borrow and return books, utilizing advanced data structures and file handling. **Description:** • **File I/O:** Implement features where books and user information are stored in text files. When a user borrows or returns a book, the system updates the respective files. • **Stack and Queue:** Use a **stack** to manage the last borrowed books (LIFO) and a **queue** for waiting lists (FIFO) for popular books. • **Generics and Collections:** Create a generic collection class to store different types of books (e.g., hard copies, e-books) and user information. **Exception Handling:** Handle cases like borrowing an unavailable book, returning a book not borrowed, or invalid user actions gracefully with appropriate exceptions.	2

Pedagogy	Implementation	
3	**Client-Server File Transfer System (Network Programming)** **Objective:** Develop a client-server system where users can request and download files using both gRPC and REST. **Description:** • **gRPC-based Client-Server Communication:** Implement a system where the client requests files using gRPC. The server responds by sending the requested file through a gRPC stream. • **REST-based File Transfer:** Implement an HTTP-based REST client-server system. The client sends a GET request, and the server responds with the requested file. • **Multithreading:** Add multithreading on both the client and server sides, allowing multiple users to request and receive files concurrently. • **Exception Handling:** Ensure error handling for network issues, invalid file requests, and unexpected interruptions in communication.	**2**
Pedagogy	Hands-on	
4	**Operating System Scheduling Simulator (Process Scheduling & Multithreading)** **Objective:** Build a simulator to demonstrate round-robin scheduling in operating systems with multithreading concepts. **Description:** • **Round-Robin Scheduling:** Implement preemptive and non-preemptive round-robin scheduling for processes with different burst times. Display the waiting times and turnaround times for each process. • **Multithreading:** Use multithreading to simulate multiple processes running concurrently. Each process should be a separate thread, and the scheduler should switch between processes based on time slices. • **Data Structures:** Use appropriate data structures such as queues to store processes and manage their scheduling. • **Exception Handling:** Handle edge cases such as processes with zero burst time or invalid input, ensuring the program runs smoothly.	**2**
Pedagogy	Simulation	
5	**Web-Based Student Management System (Web Frameworks & Dependency Injection)** **Objective:** Develop a full-fledged web-based student management system using Struts and Spring frameworks, integrating all the learned concepts. **Description:**	**2**

	• **Spring Framework & Dependency Injection:** Build a Spring-based backend where services (such as student management and validation) are injected into the controller for managing operations like adding, updating, and deleting student records. • **Struts Framework:** Use Struts for the front end, creating web forms for users to input and modify student information. Implement form validation and error handling using Struts features. • **File I/O & Data Persistence:** Store student records in a text file or database, and implement functionality to read and write data to these files. • **Multithreading:** Use multithreading to handle concurrent user requests efficiently, ensuring the system can manage multiple operations like record updates simultaneously. • **Generics & Collections:** Use generics and collections to manage student records (e.g., using a List<Student> to store and display student data). • **Exception Handling:** Implement robust error handling for invalid inputs, database connection failures, or missing files. Ensure user-friendly error messages and smooth system operation.	
Pedagogy	Integration	
	Summary of Modules: 1. **Module 1:** Focuses on Object-Oriented Programming (OOP) principles, file I/O, exception handling, and generics. 2. **Module 2:** Centers on advanced data structures like stacks and queues, integrated with file I/O and exception handling. 3. **Module 3:** Emphasizes network programming using gRPC and REST, with multithreading and exception handling. 4. **Module 4:** Simulates round-robin scheduling algorithms using multithreading and appropriate data structures. 5. **Module 5:** Combines web development (Struts and Spring), dependency injection, file I/O, multithreading, and exception handling into a single web-based system.	**2**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Herbert Schildt, "Java: The Complete Reference", 11th Edition, McGraw-Hill Education, 2018. (ISBN: 978-1260440232)
2	Jim Keogh, "The Complete Reference J2EE", 1st Edition, McGraw-Hill Education, 2002. (ISBN: 978-0072224726)
Reference Books	
1	Kathy Sierra and Bert Bates, "Head First Java", 2nd Edition, O'Reilly Media, 2005. (ISBN: 978-0596009205)

2	Joshua Bloch, "Effective Java", 3rd Edition, Addison-Wesley Professional, 2017. (ISBN: 978-0134685991)
3	Bruce Eckel, "Thinking in Java", 4th Edition, Prentice Hall, 2006. (ISBN: 978-0131872486)
4	Cay S. Horstmann, "Core Java Volume I--Fundamentals", 11th Edition, Prentice Hall, 2018. (ISBN: 978-0135166307)
5	Robert C. Martin, "Clean Code: A Handbook of Agile Software Craftsmanship", 1st Edition, Prentice Hall, 2008. (ISBN: 978-0132350884)

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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Students will be able to design and implement Java applications incorporating OOP principles, handle exceptions effectively, and perform file I/O operations.	**L3**	**Apply**
CO2	Students will demonstrate the ability to develop web applications using the Struts framework, and create applications with dependency injection using the Spring framework, showcasing their proficiency in modern Java technologies.	**L3**	**Apply**
CO3	Students will exhibit skills in implementing advanced data structures, conducting socket programming for client-server communication, and simulating operating system scheduling algorithms, along with creating Unix shell scripts for inter-process communication.	**L4**	**Analyze**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**		**3**												**3**
CO2			**3**		**3**										**3**
CO3	**3**		**3**		**3**										**3**

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc22_cs47/preview

2	https://www.coursera.org/specializations/object-oriented-programming
3	https://www.coursera.org/specializations/java-programming

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Theory**			
	Continuous Assessment Tests (IAT)		**Continuous Comprehensive Assessment (CCA)**	
	IAT-1	**IAT-2**	**CCA-1**	**CCA-2**
	50 Marks	**50 Marks**	**50 Marks**	**50 Marks**
Remember	10			
Understand	10			
Apply	5			
Analyse		10		
Evaluate		10		
Create		5		

SEE- Semester End Examination (50 Marks)

Bloom's Category	**SEE Marks (90% Theory+10% Practical Questions)**
Remember	**10**
Understand	**20**
Apply	**30**
Analyse	**10**
Evaluate	**10**
Create	**20**

Weekly Plan of Action

The students will take a bridge course on the necessary prerequisite from Infosys Springboard, Udemy or any other Platforms during their holidays after their 2nd semester.
Every week the students shall follow the plan of action as stated

Week	Lab work	Project work
Week 1:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	Ideation and Selection • Brainstorming • Refining the Idea
Week 2:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	Planning and Research • Defining Goals and Objectives • Research and Resource Gathering
Week 3:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	• Research and Resource Gathering • Developing a Project Plan
Week 4:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	Execution and Development: • Carry Out Your Plan • Collaboration and Communication
Week 5:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	• Carry Out Your Plan • Collaboration and Communication
Week 6:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in "Leadcode" Platform	• Carry Out Your Plan • Collaboration and Communication
Week 7:	**CIE 1:** Lab test will be conducted on the problem statements practised during the lab sessions	
Week 8:	20 Mins – Faculty will brush up the concepts.	• Carry Out Your Plan • Collaboration and

	40 Mins – Students will practice problems in “Leadcode” Platform	Communication
Week 9:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in “Leadcode” Platform	Reflection and Presentation • Analyzing and Interpreting Results • Developing a Presentation
Week 10:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in “Leadcode” Platform	• Developing a Presentation: • Self-Reflection
Week 11:	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in “Leadcode” Platform	Evaluation and Finalization • Teacher Feedback and Assessment
Week 12	20 Mins – Faculty will brush up the concepts. 40 Mins – Students will practice problems in “Leadcode” Platform	Revision and Finalization
Week 13	**CIE 2:** Students shall Design solutions for the Open Ended Questions and Project Demo	
SEE: Project Demonstration and Viva Voce		

Project Based Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on

…….

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide

Designation

Department of Computer Science and Engineering

Project Based Learning – Student(s) – Guide – Interaction

Date		
PBL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning – Continuous Evaluation

Batch No.	Name	USN	Marks assigned	Remarks by the guide on the progress of the project

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET							
Batch No.	Name of the Student	USN	**Phase I (25 Marks)**		**Phase II (25 Marks)**		**Final CIE Marks (Phase I & Phase II) (50 Marks)**
			Abstract / Understanding of the Project (5 Marks)	Analysis & Design (20 Marks)	Implementation (20 Marks)	Demonstration (5 Marks)	

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning Outcomes

Sl.No	Batch No.	Name of Students	USN	Domain	Outcomes

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	10
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	2
Examination nature (SEE)	Practical (Internal Examiners only)

Semester	**:**	**3**				
Course Title	**:**	**Python Programming Lab**				
Course Code	**:**	**BCS307**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical**				
Category	**:**	**AEC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**24**		**SEE Duration**	**:**	**2 hrs**
Credits	**:**	**1**				

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the fundamentals of basic programming concepts to solve basic problems	**L4**	**An**
CO2	Inspect the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L5**	**E**
CO3	Create programs using advanced Python concepts like file handling and containers **.**	**L6**	**C**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**				**3**										
CO2		**2**			**3**										
CO3			**3**		**3**										

Weblinks and Video Lectures (e-Resources)	
1	https://www.geeksforgeeks.org/python-programming-language-tutorial/
2	https://www.w3schools.com/python/python_intro.asp
3	https://www.python.org/about/gettingstarted/
4	https://www.programiz.com/python-programming/examples
5	https://www.geeksforgeeks.org/itertools-in-python3/

CIE- Continuous Internal Evaluation (50 Marks)

Python LAB Evaluation		Allotted Marks		TOTAL CIE (50M)
Continuous Evaluation - 30 Marks	Record	10	Average Score of all experiments - 30 Marks	30
	Observation	10		
	Open Ended	10		
Lab IA- 20 Marks	Procedure write up	20	LAB IA-100 Marks	Reduced to 20
	Conduction and Results	60		
	Viva Voce	20		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	4
Understand	3
Apply	18
Analyse	4
Evaluate	3
Create	18

List of Programs:

Warmup Programs:

- Develop a simple python Program to
  - Print the sentence "Welcome to CSE, DSATM!!!"

	○ Read input number from user and check if the number is positive, negative or 0 ○ First N Natural numbers using for and while loop	
Sl. No.	**Experiments/Programs**	**COs**
1	**Functions:** **Create using Python** a. A Simple calculator. b. A program to define a function with multiple return values	**CO1**
2	**Strings:** **Build python program to** a. Find the length of the string without using any library functions. b. Check if two strings are anagrams or not.	**CO1**
3	**Lists and Tuples:** **Develop a python program to** a. Perform the given operations on a list: i. Add ii. Insert iii. Slicing b. Get a list of the even numbers from a given list of numbers. c. Create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples	**CO1**
4	**Dictionaries:** **Develop a python program to** a. Check if a given key exists in a dictionary or not & to sum all the items in a given dictionary b. Convert Roman Numbers in to integer values using dictionaries	**CO2**
5	**Files:** **Build python program to** a. Sort words in a file and put them in another file. The output file should have only lower-case words, so any upper case words from source must be lowered. b. Find the most frequent words in a text. (read from a text file).	**CO1**
6	**Pattern Recognition & Regular Expressions** a. Write a function called isphonenumber () to recognize a pattern 415-555-4242 without using regular expression and also write the code to recognize the same pattern using regular expression. b. Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses (sample@gmail.com)	**CO2**
7	**Classes** a. Write a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle. b. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Use **list** to store the marks in three subjects and total marks. Use **init()** method to initialize name, USN and the lists to store marks and total, Use **getMarks()** method to read marks into the list, and **display()** method to display the score card details.]	**CO2**
8	**Polymorphism and Inheritance** a. By using the concept of inheritance write a python program to find the area of triangle, circle and rectangle b. Write a python program to find the whether the given input is palindrome or	**CO2**

	not (for both string and integer) using the concept of polymorphism and inheritance.	
9	**lambda and filter functions** **a.** Develop a python program to differentiate between Lambda functions and def defined function **b.** Develop a python program to find maximum of two numbers using lambda function **c.** Create a list of numbers. Separate the odd numbers of the list using filter() and lambda function	**CO2**
10	**map and itertools** a. Write a python program to Multiply all elements of a list by 2 using lambda and map() function b. Write a Python program to generate combinations of a given length of a given iterable	**CO3**
	Open ended Programs	
1	Develop a python program to print half pyramid, inverted half pyramid of numbers and Pascal's Triangle	**CO1**
2	Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number	**CO2**
3	Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.	**CO3**
4	Develop a python program to demonstrate Exception Handling	**CO3**
5	Develop a python program to transform all elements of a list to upper case using lambda and map() function	**CO3**

CIE for Python Programming Lab (Ability Enhancement Course (Practical)):
CIE marks for the practical course are 50 Marks.
The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks).
- The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

SEE for Python Programming Lab (Ability Enhancement Course(Practical))

- SEE marks for the practical course are 50 Marks
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the exami Jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part to be made zero.
- The minimum duration of SEE is 02 hours

Note: L- Theory Lecture, T- Tutorial, P-Practical, S-Project, IPCC: Integrated Professional Core Course,
CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

1 Credit Course – Practical

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 40% of the maximum Marks (20 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (20 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

- SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here,
    - Writeup-20%,
    - Conduction procedure and result in -60%,
    - Viva-voce 20% of maximum marks.

  SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
- The minimum duration of SEE is 02 hours.

SOCIAL CONNECT
&
RESPONSIBILITY (SCR)

SCR- Social Connect & Responsibility

Teaching Hours/Week (L: T: P: S)	0:0:0:2
Total Hours of Pedagogy	40-hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	100
SEE Marks	------
Total Marks	100
Exam Hours	----
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.

Semester	**:**	**3**				
Course Title	**:**	**Social Connect & Responsibility**				
Course Code	**:**	**BSCK308**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Experiential learning**				
Category	**:**	**SCR**				
Stream	**:**	**CSE**		**CIE**	**:**	**100**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:0:2**		**SEE**	**:**	**NA**
Total Hours	**:**	**40-hour Practical Session + 15 hour Planning**		**SEE Duration**	**:**	**NA**
Credits	**:**	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Provide a formal platform for students to communicate and connect to the surrounding.
2	create a responsible connection with the society.
3	Understand the community in general in which they work.
4	Identify the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Teaching-Learning Process

General Instructions - Pedagogy:

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- State the need for activities and its present relevance in the society and provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills

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COURSE CURRICULUM

Contents:

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Module No.	Topics	Hours
1	**Part I:** **Plantation and adoption of a tree:** Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - – Objectives, Visit, case study, report, outcomes.	8
Pedagogy	**Poster Presentation**	
2	**Part II :** **Heritage walk and crafts corner:** Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - – Objectives,Visit, case study, report, outcomes.	8
Pedagogy	**Poster Presentation**	
3	**Part III :** **Organic farming and waste management:** Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus –Objectives,Visit, case study, report, outcomes.	8
Pedagogy	**Demonstration**	
4	**Part IV:** **Water conservation:** Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.	8
Pedagogy	**Demonstration**	

5	**Part V :** **Food walk:** City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study,report, outcomes.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Activities: Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.
PEDAGOGY: The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersionwith NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?
COURSE TOPICS: The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.
Duration : A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per guidelines of scheme & syllabus.

Continuous Internal Evaluation (CIE):

- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50.
- Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing
- Considering all above points allotting the marks as mentioned below

Excellent : 80 to 100

Good : 60 to 79

Satisfactory : 40 to 59

Unsatisfactory and fail: <39

Pedagogy – Guidelines:

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl.No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Plantation and adoption of a tree:	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc….	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
2.	Heritage walk and crafts corner:	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Site selection /proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
3.	Organic farming and waste management:	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc….	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	Water conservation: & conservation techniques	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers / campus etc…..	Site selection / proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
5.	Food walk: Practices in societ	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Governme nt Schemes officers/ campus etc…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

1 Credit Course – Practical + Planning

Assessment Details (both CIE and SEE)

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

Plan of Action (Execution of Activities)	
Sl.No	**Practice Session Description**
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student at the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

<table>
<tr><td>Weightage</td><td>CIE – 100%</td><td rowspan="7">• Implementation strategies of the project (NSS work).
• The last report should be signed by NSS Officer, the HOD and principal.
• At last report should be evaluated by the NSS officer of the institute.</td></tr>
<tr><td>Field Visit, Plan, Discussion</td><td>10 Marks</td></tr>
<tr><td>Commencement of activities and its progress</td><td>20 Marks</td></tr>
<tr><td>Case study-based Assessment Individual performance with report</td><td>20 Marks</td></tr>
<tr><td>Sector wise study & its consolidation 5*5 = 25</td><td>25 Marks</td></tr>
<tr><td>Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25</td><td>25 Marks</td></tr>
<tr><td>Total marks for the course in each semester</td><td>100 Marks</td></tr>
<tr><td colspan="3">For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.</td></tr>
<tr><td colspan="3">Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.</td></tr>
</table>

Course - Skills Mapping Table

3rd Semester					
Sl.No	**Name of the Course**	**Course Code**	**Course Type**	**Course Category**	**Skills attained by the students**
1	Data Structures and Applications	BCS302	Integrated	**IPCC**	1. Understanding Core Data Structures 2. Logical Thinking 3. Problem-Solving Skills 4. Python Programming Proficiency
2	Digital Design and Computer Organization	BCS303	Integrated	**IPCC**	1. Understanding of Logic Gates and Circuits 2. Circuit Design and Simulation 3. Microlevel understanding of execution of instructions
3	Java and J2EE Lab	BCS306	Project	**PBL**	1. Java Programming Proficiency 2. Teamwork
4	Python Programming Lab	BCS307	Practical - Experiential	**AEC**	1. Data Collection and Preparation 2. Data Visualization 3. Prerequisites for AI and ML

BASIC SCIENCE COURSE (BSC)

Semester	**:**	**4**				
Course Title	**:**	**Statistics and Probability**				
Course Code	**:**	**23MAT41**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**BSC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40 Hrs**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding Engineering problems
2	Use concepts of statistics and probability in solving problems
3	Analyze problems using concepts of statistics and probability
4	Use MATLAB to obtain solutions of various mathematical problems.

Teaching-Learning Process
Pedagogical Initiatives:
Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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COURSE CURRICULUM

Module No.	Topics	Hours
1	**Statistics** Introduction, curve fitting (Least squares method), fitting of a straight line, fitting of a second-degree parabola, fitting of exponential curves, correlation and correlation coefficient r, regression lines, rank correlation	8
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
2	**Probability Distribution** Review of basic probability theory, random variables (discrete and continuous), probability mass and density functions, mathematical expectation, mean and variance, binomial, Poisson, normal, exponential distribution, Weibull and uniform distributions.	8
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
3	**Sampling Theory** Introduction, sampling distribution, standard error, testing of hypothesis, central limit theorem, levels of significance, z- test for large samples, confidence limits, Student's 't' distribution, Chi-square distribution as a test of goodness of fit, F-Distribution.	8
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
4	**ANOVA** The ANOVA technique, basic principle of ANOVA, one-way ANOVA, Two-way ANOVA, Latin-square Design	8
Pedagogy	**Chalk and board, group discussion, ppt, videos**	
5	**Time series and Markov chain** **Time series:** Introduction to times series data, Components of a time series, Decomposition of time series, method of semi averages, fitting a various mathematical curve and growth curves. **Markov chain**: Introduction to stochastic process, probability vectors, stochastic matrices, regular stochastic matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains.	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in	

	order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
	NIL	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Higher Engineering Mathematics, B. S. Grewal, Khanna publishers, 44th Ed., 2021.
2	Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce & Peter Gedeck O'Reilly Media, Inc., 2nd edition 2020.
3	Fundamentals of Mathematical Statistics, S.C.Gupta and V.K.Kapoor, Chand Publishers,12th edition,2020.
Reference Books	
1	Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan**,** Schaum's outline series, Mc Graw Hill Publication, 4th Edition, 2012.
2	Research Methodology Methods & Techniques, C R Kothari and Gaurav Garg, New Age International Limited, 3rd Edition, 2014
3	Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye, Pearson Education, 9th edition, 2017

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the basic concepts of statistics and probability	**L1/L2**	**U**
CO2	Apply techniques of statistics and probability to solve engineering problems	**L3**	**Ap**
CO3	Analyze engineering problems using statistics and probability	**L4**	**An**
CO4	Develop mathematical solutions to various real time problems using MATLAB	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3														
CO3		2													
CO4			2		2				1	1					

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2	https://avcce.digimat.in/nptel/courses/video/111107058/L05.html
3	https://archive.nptel.ac.in/courses/111/106/111106086/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember			30	
Understand	10	10	20	
Apply	30	30		
Analyse	10	10		
Evaluate				50
Create				

CIE Course Assessment Plan

	Marks Distribution		

CO's	Test-1			Test-2			Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5	2.5	2.5	5	10	30	20%
CO2	15	15	7.5	7.5	15	30	90	60%
CO3	5	5	2.5	2.5	5	10	30	20%
CO4	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--
Total	25	25	12.5	12.5	25	50	150	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	5
Apply	35
Analyse	10
Evaluate	--
Create	--

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	--	--	--	--	--	5	10%
CO2	5	5	5	5	5	10	35	70%
CO3	--	5	--	--	5	--	10	20%
CO4	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--
Total	20	20	5	5	10	10	50	100%

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 40% of the maximum marks (20 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests
  (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment (CCA) methods.
- The first Internal test at the end of 40-50% coverage of the syllabus

- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (CIE) for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test **(duration 03 hours)** at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.
  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical

component.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be (CCA1+CCA2)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through rubrics.
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**15**	6	Average of Two Internal test each of 50 Marks scale down the marks to 15
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	**10**	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives/ Activity based learning		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25

CIE	**Practical**	Conduction of Experiments	Performance - Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced
			Execution	10					
			Viva-voce	05					
					Total CIE Practical		**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test

								and Open-Ended Experiment
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Semester	**:**	**4**				
Course Title	**:**	**Design and Analysis of Algorithms**				
Course Code	**:**	**BCS402**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40 hrs**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Explain the methods of analyzing the algorithms and to analyze performance of algorithms.
2	State algorithm's efficiencies using asymptotic notations.
3	Solve problems using algorithm design methods such as the brute force method, greedy method, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking and branch and bound.
4	Choose the appropriate data structure and algorithm design method for a specified application.
5	Design and implement solution for a given problem component using Modern tools
6	Introduce P and NP classes.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction:** Notion of algorithm, Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithmic Efficiency: Analysis frame work, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms. **Brute Force:** Selection Sort and Bubble Sort.	8
Pedagogy	**Demonstration and Practical Based Learning**	
2	**Divide and Conquer:** Merge sort, Quicksort, Multiplication of long integers, Strassen's Matrix multiplication. **Decrease and Conquer:** Insertion Sort, Depth First Search, Breadth First Search, Topological Sorting, Applications of DFS and BFS	8
Pedagogy	**Demonstration, Presentation and Practical Based Learning**	
3	**Transform and Conquer:** Presorting, Heaps and Heapsort, Problem reduction. **Space and Time Tradeoffs:** Sorting by Counting, Naive String Matching, Input Enhancement in String Matching: Horspool's and Boyer-Moore algorithm.	8
Pedagogy	**Demonstration, Presentation, Practical Based Learning and collaborative learning**	
4	**Dynamic Programming:** Computing a Binomial Coefficient, Warshall's and Floyd's Algorithms, The Knapsack Problem and Memory Functions. **Greedy Technique:** Prim's Algorithm, Dijkstra's Algorithm, Huffman Trees and codes.	8
Pedagogy	**Demonstration, Presentation, Practical Based Learning, collaborative learning and Case Study**	
5	**Backtracking :** N-Queen's Problem, Sum of Subset Problem. **Branch-and-Bound. :** Travelling Sales Person problem,0/1 Knapsack problem **NP and NP-Complete Problems :** Basic concepts, nondeterministic algorithms, P, NP, NP Complete, and NP-Hard classes	8
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Write a program to sort a given set of elements using Merge sort method and find the time required to sort the elements.	**CO6**
2	Write a program to sort a given set of elements using Quick sort method and find the time required to sort the elements	**CO6**
3	Write a program to print all the nodes reachable from a given starting node in a graph using Depth First Search method and Breadth First method. Also check connectivity of the graph. If the graph is not connected, display the number of components in the graph.	**CO6**
4	Write a program to obtain the Topological ordering of vertices in a given digraph using a. Vertices deletion method **b.** DFS method	**CO6**
5	Write a program to sort a given set of elements using Heap sort method. Find the time complexity.	**CO6**
6	Write a program to implement Horspool's algorithm for String Matching.	**CO6**
7	Write a program to implement 0/1 Knapsack problem using dynamic programming	**CO6**
8	Write a program to find Minimum cost spanning tree of a given undirected graph using Prim's algorithm.	**CO6**
9	Write a program to find the shortest path using Dijkstra's algorithm for a weighted connected graph.	**CO6**
10	Write a program to find a subset of a given set S = {S1, S2,.....,Sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S ={1, 2,5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution	**CO6**
11	Write a program to implement N -queens problem using backtracking	**CO6**
12	Write a program to solve TSP problem using branch and bound.	**CO6**
	Open ended Programs	
1	Students have to solve a given problem using different design technique. The analysis with the comparison of the implemented algorithm has to be demonstrated. The problem types will be one among the following: (Any other problem can be included) 1. Sorting 2. String matching 3. Travelling salesman problem 4. Shortest Path 5. Knapsack Problem	

Textbooks	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Introduction to the Design and Analysis of Algorithms, Anany Levitin, University, 3rd Edition, 2012, Pearson, ISBN 13: 978-0-13-231681-1.
2	Introduction to Algorithms, Cormen T.H., Leiserson C.E., Rivest R.L., Stein C., 4th Edition, 2022, PHI, ISBN:978-0262046305.
Reference Books	
1	Computer Algorithms, Horowitz E., Sahani S., Rajasekharan S., 2nd Edition, 2007, Galgotia Publications, ISBN:9780716783169.

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Define, Understand and Explain the concepts of Algorithms.	**L1/L2**	**U**
CO2	Apply the concepts of Algorithm technique in problem solving	**L3**	**Ap**
CO3	Analyze the given scenario and use appropriate algorithm to arrive at a solution	**L4**	**An**
CO4	Design and implement solution for a given problem component using Modern	**L6**	**C**
CO5	Evaluate the efficiency of the algorithms used in problem solving	**L5**	**E**
CO6	Conduct experiments on Data Structures using modern IDE	**L3**	**Ap**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	**2**														
CO3		**2**													
CO4			**3**						**3**						
CO5				**2**					**2**	**2**					
CO6					**2**								**2**		

Weblinks and Video Lectures (e-Resources)	
1	http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html
2	https://nptel.ac.in/courses/106/101/106101060/
3	http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html
4	http://cse01-iiith.vlabs.ac.in/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	20	10			
Understand	20	10	**10**		10
Apply	10	20	**10**		10
Analyse		10	10		10
Evaluate				10	10
Create				10	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	**10**	**10**	**5**		**5**	**10**	**40**	**26.5%**
CO2	**10**	**10**	**5**		**5**	**10**	**40**	**26.5%**
CO3	**5**	**5**		**10**	**10**	**20**	**50**	**35%**
CO4				**5**	**5**	**10**	**20**	**14%**
CO5								
Total	**25**	**25**	**10**	**15**	**25**	**50**		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%+2%
Understand	20%+2%
Apply	40%+4%
Analyse	20%+2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2	-	10	5	5	10	10	40	40%
CO3					10	10	20	20%
CO4								
CO5								
Total	20	20	10	10	20	20	100	100%

Semester	**:**	**4**				
Course Title	**:**	**Database Management Systems**				
Course Code	**:**	**BCS403**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamental concepts of Database Management Systems
2	Apply the concepts of Database for the given Scenario
3	Analyse given scenario and use appropriate Database Technique
4	Design database or application for a given scenario
5	Implement a database application for a given real world problem.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
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COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Databases:** Introduction, Characteristics of database approach, Advantages of using the DBMS approach. **Overview of Database Languages and Architectures:** Data Models, Schemas and Instances, Three schema architecture and data independence, database languages and interfaces, The Database System environment. **Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams.	8
Pedagogy	**Presentation, Quiz**	
2	**Relational Model:** Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. **Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping.	8
Pedagogy	**Collaborative Learning, Presentation**	
3	**SQL:** SQL data definition and data types, Schema change statements in SQL, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. **SQL: Advanced Queries:** More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL. **Web Database Programming Using PHP:** A Simple PHP Example, Overview of Basic Features of PHP, Overview of PHP Database Programming, Brief Overview of Java Technologies for Database Web Programming.	8
Pedagogy	**Practical Based Learning, Project Based Learning**	
4	**Normalization:** Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. **Transaction Processing:** Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL	8

Pedagogy	Practical Based Learning, Project Based Learning	
5	**Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. **Database Security:** Introduction to Database Security Issues, Discretionary Access Control Based on Granting and Revoking Privileges, Mandatory Access Control and Role-Based Access Control for Multilevel Security, SQL Injection, Challenges to Maintaining Database Security.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Create a table called Employee & execute the following. **Employee(EMPNO,ENAME,JOB, MANAGER_NO, SAL, COMMISSION)** 1. Create a user and grant all permissions to the user. 2. Insert the any three records in the employee table contains attributes EMPNO,ENAME JOB, MANAGER_NO, SAL, COMMISSION and use rollback. Check the result. 3. Add primary key constraint and not null constraint to the employee table. 4. Insert null values to the employee table and verify the result.	**CO5**
2	Create a table called Employee that contain attributes EMPNO,ENAME,JOB, MGR,SAL & execute the following. 1. Add a column commission with domain to the Employee table. 2. Insert any five records into the table. 3. Update the column details of job 4. Rename the column of Employ table using alter command. 5. Delete the employee whose Empno is 105.	**CO5**
3	Queries using aggregate functions(COUNT,AVG,MIN,MAX,SUM),Group by,Orderby. **Employee(E_id, E_name, Age, Salary)** 1. Create Employee table containing all Records E_id, E_name, Age, Salary. 2. Count number of employee names from employeetable	**CO5**

	3. Find the Maximum age from employee table. 4. Find the Minimum age from employee table. 5. Find salaries of employee in Ascending Order. 6. Find grouped salaries of employees.	
4	Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old & new Salary. **CUSTOMERS(ID,NAME,AGE,ADDRESS,SALARY)**	**CO5**
5	Create cursor for Employee table & extract the values from the table. Declare the variables ,Open the cursor & extrct the values from the cursor. Close the cursor. **Employee(E_id, E_name, Age, Salary)**	**CO5**
6	Write a PL/SQL block of code using parameterized Cursor, that will merge the data available in the newly created table N_RollCall with the data available in the table O_RollCall. If the data in the first table already exist in the second table then that data should be skipped.	**CO5**
7	Develop a simple web application using PHP to manage a product inventory. Connect to a MySQL database to store product information (name, price, quantity). Allow users to view the inventory, add new products, and update existing product details.	**CO5**
8	Analyze different concurrency control mechanisms (locking, timestamps) for managing concurrent access to a database. Simulate scenarios with multiple users modifying the same data and demonstrate how locking or timestamps prevent data inconsistencies.	**CO5**
9	Create a database for a library management system. Include tables for books, authors, and members. Use appropriate data types and constraints (primary key, foreign key, etc.). Write queries to: • List all books by a specific author. • Find books borrowed by a particular member but not yet returned. • Calculate the total number of books in each category.	**CO5**
10	Analyze a sample database schema provided by your instructor. Identify any normalization anomalies (redundancy, inconsistency). Apply normalization techniques (1NF, 2NF, 3NF, BCNF) to bring the schema to a higher normal form, minimizing data redundancy.	**CO5**
Open ended Programs		
1	Create a database for a university course registration system. Include tables for courses, students, and enrollments. Use views to simplify complex queries. Write queries using views to: • List all courses offered by a specific department with the number of enrolled students. • Find students enrolled in more than two courses this semester. • Create a trigger to automatically update a "total credits" field for a student whenever they enroll in a new course.	
2	Simulate a bank transaction system using SQL. Implement transactions with ACID properties (Atomicity, Consistency, Isolation, Durability) using appropriate SQL	

	statements (BEGIN TRANSACTION, COMMIT, ROLLBACK). Develop functionalities for deposit, withdrawal, and fund transfer between accounts, ensuring data integrity across operations.	
3	Implement user authentication and access control mechanisms for a database using SQL. Create different user roles with varying privileges (read, write, delete) for specific tables. Develop a program to demonstrate secure login and authorization based on user roles.	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson
2	
Reference Books	
1	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill
2	Database System Concepts by S. Sudarshan, Henry F. Korth and Abraham Silberschatz, 2019, McGraw Hill

Course Outcomes: At the end of the course, the student will be able to:

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Understand the concepts of Database Management Systems	**L2**	**U**
CO2	Apply the concepts of Database for the given Scenario	**L3**	**Ap**
CO3	Analyze given scenario and use appropriate Database Technique	**L4**	**An**
CO4	Design database or application for a given scenario	**L6**	**C**
CO5	Ability to implement a database application for a given real world problem	**L6**	**C**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3														
CO3		2													
CO4			2							2	2				
CO5					2					2	2		2		

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/@stanforddbclass4747
2	https://onlinecourses.nptel.ac.in/noc21_cs04/preview
3	https://youtube.com/playlist?list=PLxCzCOWd7aiFAN6I8CuViBuCdJgiOkT2Y&feature=shared
4	https://www.javatpoint.com/dbms-tutorial

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests(IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	20	10			
Understand	20	10	**10**		10
Apply	10	20	**10**		10
Analyse		10	10		10
Evaluate				10	10
Create				10	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	2.5	2.5	5	10	40	26.5%
CO2	10	10	2.5	2.5	5	10	40	26.5%
CO3	5	5	5	5	10	20	50	35%
CO4			2.5	2.5	5	10	20	14%
CO5								
Total	25	25	12.5	12.5	25	50		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%+2%
Understand	20%+2%
Apply	40%+4%
Analyse	20%+2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2	-	10	5	5	10	10	40	40%
CO3					5	5	10	10%
CO4					5	5	10	10%
CO5								
Total	20	20	10	10	20	20	100	100%

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

Assessment Details (both CIE and SEE)

- The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
- The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
    - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
    - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

Possible Continuous and Comprehensive Assessment (CCA):

- Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	**25**	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

Semester	**:**	**4**				
Course Title	**:**	**Industrial Internet of Things**				
Course Code	**:**	**23CSE44**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**PCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To impart knowledge on the infrastructure, sensor technologies and networking technologies of Internet of Things.
2	To understand latest concepts used in Industries.
3	To analyse, design and develop solutions for Internet of Things.
4	To explore the real-life aspects of Internet of Things.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal-solutions
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Overview of Internet of Things:** IoT Architecture, Application-based IoT Protocols, Industry 4.0, IIoT. **Industrial Internet of Things: Basics**- IIoT and Industry 4.0, Industrial Internet Systems, Industrial sensing, Industrial Processes. (Text 1: Chapter 1: 1.3, 1.4, Chpater 2: 2.2-2.3, Chapter 4: 4.1.1 to 4.4.3)	**8**
Pedagogy	**Case Study**	
2	**Key Technologies: Off-site Technologies:** Introduction, Cloud Computing, Necessity of cloud computing Cloud computing and IIoT , Industrial cloud platform providers, SLA for IIoT, Requirements of Industry 4.0 and its solution, Fog Computing, Fog computing for IIoT Applications of fog and their solutions. **On-site Technologies:** Need for Industry 4.0, Transformations required, Augmented Reality, Virtual Reality, Big Data and Advanced Analytics, Smart factories (Text 1: Chapter 6: 6.1 to 6.3, Chapter 7: 7.1 to 7.5)	**8**
Pedagogy	**Video Demonstration**	
3	**Paradigms, Challenges:** Evolution of New IoT Paradigms, Internet of battlefield things (IoBT) , Internet of vehicles (IoV) , Internet of underwater things (IoUT) , Internet of drones (IoD) , Internet of space (IoSpace) , Internet of services (IoS) , Internet of people (IoP) , Internet of nano things (IoNT) , Internet of everything (IoE). **Challenges Associated with IoT:** Mobility , Addressing , Power , Heterogeneous connectivity , Communication range , Security , Device size ,Contents xv , Interoperability. (Text 2: Chapter 15: 15.2 to 15.3)	**8**
Pedagogy	**Debate/ group discussion**	
4	**Emerging Pillars of IoT:** Big data, Cloud/fog/edge computing, 5G and beyond, Artificial intelligence (AI)/Machine learning (ML), Cognitive communication networks, Cognitive communication networks, Software-defined networks (SDN), Phantom networks. (Text 2: Chapter 15: 15.4)	**8**
Pedagogy	**Flipped Classroom**	

5	**IoT Sensing and Actuation:** Sensor Categories- Thermal sensors, Mechanical sensors, Electrical sensors, Chemical sensors, Optical sensors , Acoustic sensors, Actuators- Thermal Actuators, Hydraulic Actuators, Pneumatic Actuators, Electromechanical Actuators Case Studies: Manufacturing Industry, Automotive Industry- Background of the industry, Challenges, Industrial IoT as a solution, Benefits. (Text 1: Chapter 8: 8.3, Chapter 9: 9.2 to 9.5, Chapter 17: 17.2, 17.3)	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	S. Misra, C. Roy, and A. Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.2020
2	S. Misra, A. Mukherjee, and A. Roy, Introduction to IoT. Cambridge University Press, 2020 e book pdf
Reference Books	
1	Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri. Internet of Things: Architectures, Protocols and Standards, 2019, 1st Edition, Wiley Publications, USA.
2	Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies Sensors for the Internet of Things Businesses & Market Trends 2014 -2024',Yole Development Copyrights ,2014

Course Outcomes: At the end of the course, the student will be able to:

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	To apply the knowledge of the infrastructure, sensor technologies and networking technologies of Internet of Things.	**L3**	**U**
CO2	Analyse the latest concepts used in Industries.	**L4**	**AP**
CO3	Design and develop solutions for Internet of Things.	**L4**	**AN**
CO4	Interpret the real-life aspects of Internet of Things.	**L2**	**AN**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3												
CO3			3											
CO4									2	2		2		2

Weblinks and Video Lectures (e-Resources)	
1	https://online.vtu.ac.in/course-details/Introduction-To-Industry-40-And-Industrial-Internet-Of-Things
2	https://www.cisco.com/c/en/us/solutions/internet-of-things/what-is-industrial-iot.html

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember		10	15	
Understand	8	12	15	10
Apply	12	8	10	10
Analyse	5	5	10	15
Evaluate				15

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	03	03	02	02	05	02	17	40%
CO2	04	04	05	02	05	04	22	40%
CO3				02	04	05	11	20%
CO4								
Total							50	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	20
Apply	20
Analyse	10
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	3	3	2	2	5	5	20	40%
CO2	4	4	4	4	2	2	20	40%
CO3			5	5			10	20%
CO4								--
CO5								--
Total	7	7	11	11	7	7	50	100%

Semester	**:**	**4**				
Course Title	**:**	**Unix Programming**				
Course Code	**:**	**BCS404**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**PCC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the features and architecture of UNIX and its commands.
2	Discuss different UNIX files and permissions
3	Understand essential facets of shell programming in order solve the shell script problems
4	Control and manipulate processes using system calls such as fork, exec, and wait and implement inter-process communication (IPC) mechanisms like pipes, message queues, and shared memory.
5	Utilize Unix signals for inter-process communication and control.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem & encourage the students to come up with creative & optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
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(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**UNIX Architecture and Command Usage:** Unix Architecture, Features of UNIX, POSIX and the Single UNIX Specification, Internal and External Commands, Command Structure, Flexibility of Command Usage, Man Browsing the manual pages online. **General-Purpose Utilities:** cal, date, echo, printf, bc, script, passwd, who, uname, tty, stty. **UNIX File System -** The file, what's in a filename? The parent-child relationship, pwd, the Home directory, absolute pathnames, using absolute pathnames for a command, cd, mkdir, rmdir, Relative pathnames.	8
Pedagogy	**Chalk and board, Active Learning, practical based learning, Demonstration**	
2	**Handling Ordinary Files:** cat, cp, rm, mv, more, file, wc, od, cmp, comm, diff, dos2unix and unix2dos, compressing and archiving files, gzip and gunzip, tar, zip and unzip Basic **File Attributes:** ls –l, file ownership, file permissions, chmod, directory permissions, changing file ownership. **More File Attributes:** File Systems and Inodes, Hard Links, Symbolic Links and ln, umask, Modification and Access Times	8
Pedagogy	**Chalk and board, Active Learning, Demonstration, presentation, problem solving**	
3	**Essential Shell Programming:** Shell Scripts, read, Using command line arguments, exit and exit status of command, the logical operators && and || conditional execution, the if conditional, using test and [ ] to evaluate expressions, the case conditional, expr, $0, while, for, set and shift, the here document(<<), trap, debugging shell scripts with set -x. **UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.	8
Pedagogy	**Chalk and board, Active Learning, Demonstration, presentation, problem solving**	
4	**UNIX Processes and Process Control:** The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. Process Control: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions	8
Pedagogy	**Chalk and board, Active Learning, Demonstration, presentation, problem solving**	

5	**Overview of IPC Methods:** Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V, IPC, Message Queues, Semaphores. Shared Memory, Client-Server Properties, Stream Pipes, Passing File Descriptors **Sockets:** Sockets-Socket, bind, listen, connect, accept, send, sendto, recv, recvfrom, shutdown, a Stream socket Example, Client/Server Message-Handling Example.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Sumitabha Das., Unix Concepts and Applications., 4thEdition., Tata McGraw Hill
2	W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005
Reference Books	
1	M.G. Venkatesh Murthy: UNIX & Shell Programming, Second Impression, Pearson Education.
2	Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2nd Edition, Wiley, 2014

Course Outcomes: At the end of the course, the student will be able to:

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Explain Unix Architecture, File system and use of Basic Commands	**L2**	**U**
CO2	Illustrate Shell Programming and to write Shell Scripts	**L3**	**Ap**
CO3	Categorize, compare and make use of Unix System Calls	**L4**	**An**
CO4	Develop C programs that implement file manipulation using Unix APIs.	**L6**	**C**
CO5	Build an application/service over a Unix system.	**L6**	**C**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3														
CO3		3													
CO4			3							2					
CO5			2							3	2		2		

Weblinks and Video Lectures (e-Resources)	
1	http://www.ee.surrey.ac.uk/Teaching/Unix/unixintro.html
2	https://www.tutorialspoint.com/unix/index.htm
3	http://elearning.vtu.ac.in/econtent/courses/video/CSE/CS36.html

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	20	10		
Understand	20	10	**10**	
Apply	10	20	**10**	
Evaluate				10
Create				10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	2.5	2.5	5	10	40	26.5%
CO2	10	10	2.5	2.5	5	10	40	26.5%
CO3	5	5	5	5	10	20	50	35%
CO4	--	--	2.5	2.5	--	10	20	14%
CO5	--	--	--	--	--	--	--	--
Total	25	25	12.5	12.5	25	50	--	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10% + 2%
Understand	20% + 2%
Apply	40% + 4%
Analyse	20% + 2%
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	20	10	5	5			40	40%
CO2	--	10	5	5	10	10	40	40%
CO3	--	--	--	--	10	10	20	20%
CO4	--	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--	--
Total	20	20	10	10	20	20	100	100%

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:2:2
Total Hours of Pedagogy	25 hours – Theory + Project
Credits:	02
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		**SEE**	
	Project Weekly Assessment			
Project	**Project Understanding**	05 Marks	**Write up**	10 Marks
	Technical Competence	10 Marks	**Presentation & Demonstration**	50 Marks
	Innovation	10 Marks	**Project report**	25 Marks
	Problem Solving	15 Marks	**Viva-Voce**	15 Marks
	Project Demonstration	10 Marks	**Total**	**100 Marks**
Total		**50 Marks**	**100 Marks Reduced to 50 Marks**	

17. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

18. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
- Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

19. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

20. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

21. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavours.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

22. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.
- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

23. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.
  Level 1- 2nd Year – 3rd Semester & 4th Semester
  Level 2- 3rd year – 5th Semester & 6th Semester
  Level 3 – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2**.** During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

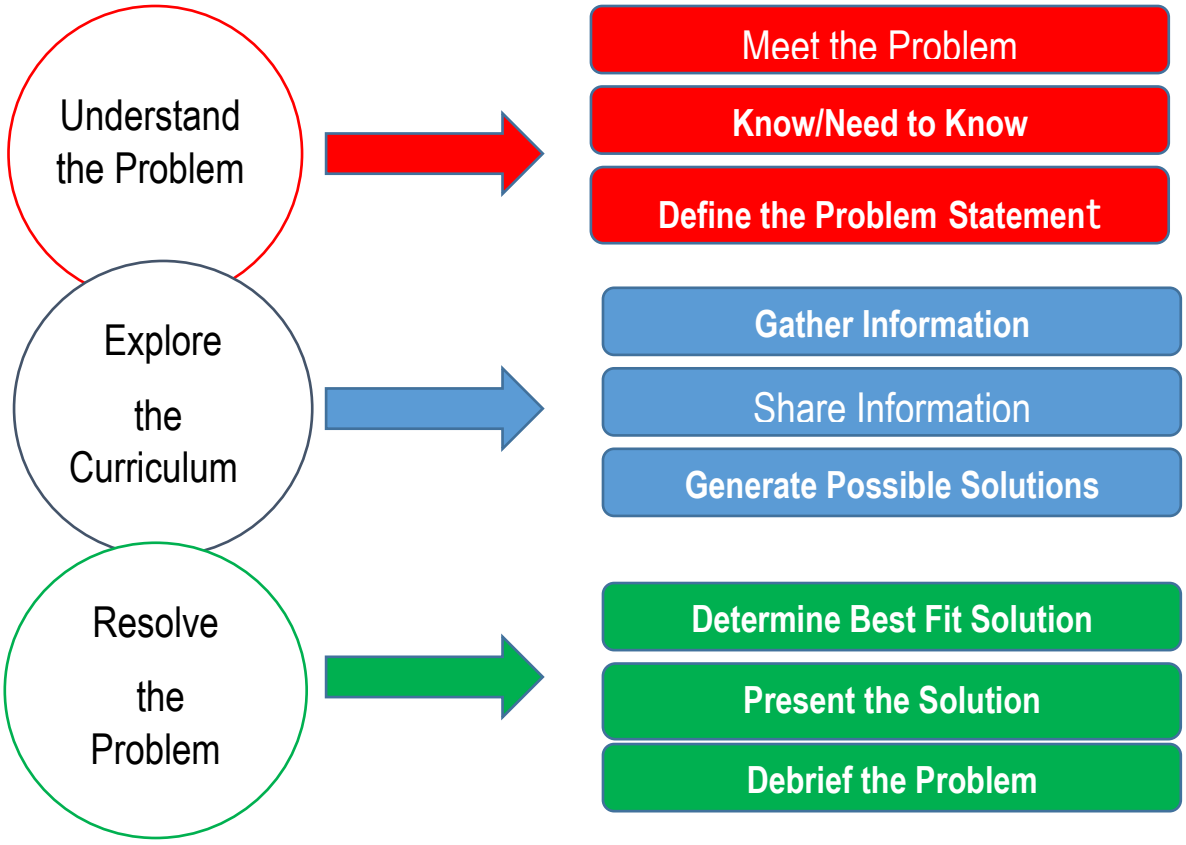
1. Phase 2 is for 11 Weeks

2**.** During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

4. Phase 1 – 25 Marks
5. Phase 2 – 25 Marks

24. PBL Teaching and Learning Template



25. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally-meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

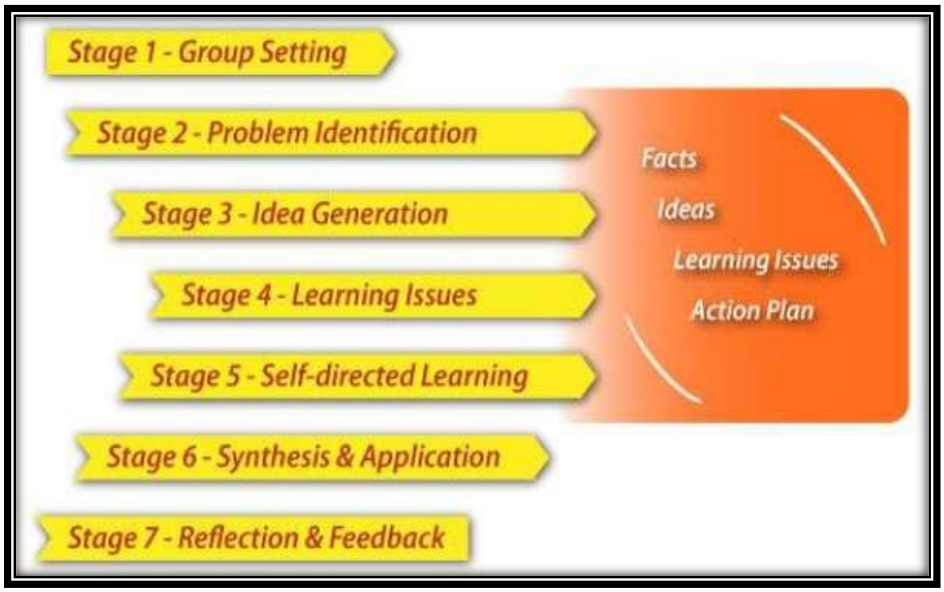
26. Obstacles/Gaps

- Lack of student's interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

27. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

28. Block diagram of PBL



29. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

30. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

Sl.No	Topics	Duration
Phase-1		
1.	Understanding of the project and preparing a project plan	**3 Weeks**
2.	Literature review	**1 Week**
3.	Planning	**1 Week**
Phase-2		
4.	Analysis and Design	**3 Weeks**
5.	Implementation	**6 Weeks**
6.	Testing	**1 Week**
7.	Writing the project report	**1 Week**
Total		**16 Weeks**

14.2 Final Presentation Structure

10. Title of the project & Batch Information
11. Agenda / Topics
12. Problem Statement / Project Definition

13. Background / Literature Review
14. Methodology
15. Analysis and Design
16. Implementation
17. Testing
18. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

17. Cover Page
18. Certificate
19. Declaration
20. Acknowledgement
21. Table of Contents
22. List of Tables
23. List of Figures
24. Introduction
25. Background / Literature Review
26. Methodology / Solution
27. Analysis and Design
28. Implementation
29. Results
30. Conclusion and Future Works
31. Bibliography / References
32. Appendices

Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25″, Right – 1″, Top and Bottom – 0.75″.
- The total number of reports to be prepared are

- One copy to the department.
- One copy to the concerned guide
- One copy to the candidate.

- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

Score Levels	Content	Conventions	Organization	Presentation
5	▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a	▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice	▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution.	▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is
4	▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic	▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice	▪ Information supports the solution to the challenge or question.	▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a	▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice	▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not

2	▪ Provides inconsistent information for solution ▪ Has no apparent application of critical thinking ▪ Has no clear goal ▪ Is pulled from few sources ▪ Has significant factual errors, misconceptions, or misinterpretations	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	4
Subject Identified for PBL	Full Stack Development
Prerequisite	Programming Fundamentals: Python Web Development Basics HTML CSS JS DJANGO Basics – framework, admin, forms , validation, migrations
Justification for the selected subject	• Django provides a full-stack framework, enabling students to learn both back-end and front-end development within a single cohesive framework. This holistic approach prepares students for real-world application development. • Python is a widely-used programming language known for its readability and ease of learning. Django leverages Python's simplicity, making it accessible for students who might still be building their programming skills. • The demand for web developers remains high. Proficiency in a widely-used framework like Django • enhances students' employment prospects. **Popular Framework**: Django is a popular framework used by many high-profile companies like Instagram, Spotify, and Mozilla.

List of possible projects	1. Develop a platform for managing educational courses where the instructor can create courses and students can enroll and participate . 2. An e-commerce platform where users can list products for sale,browse listings, and make purchases. 3.An application to manage events, allowing users to create and register for events. 4. A discussion platform where users can post questions, answers, and engage in discussions. 5. A website for users to share and discover recipes. 6. A platform for job seekers and employers to connect, where users can search and apply for jobs.

Signature of the Guide **Signature of HOD**

Semester	**:**	**4**				
Course Title	**:**	**FULL STACK DEVELOPMENT**				
Course Code	**:**	**23CSE46**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical - Project**				
Category	**:**	**PBL**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:2**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**24**		**SEE Duration**	**:**	**2 hrs**
Credits	**:**	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Gain an in-depth understanding of Django's architecture and core principles.
2	Learn Django framework libraries, views and models for developing dynamic web pages.
3	Gain in depth knowledge in understanding validation logic
4	To design, develop, and deploy a comprehensive Django application that addresses a specific real-world.

Teaching-Learning Process
Pedagogical Initiatives:
Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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COURSE CURRICULUM

Module No.	Topics	Hours
1	Web framework, Installation of python, Django, visual studio code editors, Django Basics, Django views , Mapping URL's to views, Errors in django.	5
Pedagogy	**Demonstration**	
2	Django templates,Template inheritance, Django models, Django forms, Django URL's, MVT development pattern, configuring database.	5
Pedagogy	**Case study**	
3	Django admin interface, customizing admin interface, setting for javascript in Django,JSON.	5
Pedagogy	**Case study**	
4	Postgre SQL**,** Deploy Django: ElasticBeanstalk(EB).	5
Pedagogy		
5	jQuery and basic AJAX, jQuery AJAX facilities, jQuery UI Autocomplete in Django	5
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Django 4 By Example - Fourth Edition: Build powerful and reliable Python web applications , Antonio Melé , Packt Publishing , 4th ed. Edition ,2022
2	Adrian Holovaty, Jacob Kaplan Moss, The Definitive Guide to Django: Web Development Done Right, Second Edition, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers, 2009

Reference Books	
1	Web Development with Django- A definitive guide to building modern Python web applications using Django 4,BenShaw,Saurabh Badhwar,Chris Guest, 2nd ed. Edition,2023

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply learned concepts by developing a complete web application.	L3	Apply
CO2	Develop Django views to handle web requests and responses.	L3	Apply
CO3	Analyze the effectiveness of validation logic in ensuring data integrity.	L4	Analyse
CO4	create a comprehensive Django application to address a real-world problem.	L5	create

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2					2					
CO2			3		2										
CO3				3											
CO4			3			3		2	2	3			2		

Weblinks and Video Lectures (e-Resources)	
1	MVT architecture with Django: https://freevideolectures.com/course/3700/django-tutorials
2	Using Python in Django: https://www.youtube.com/watch?v=2BqoLiMT3Ao
3	Model Forms with Django: https://www.youtube.com/watch?v=gMM1rtTwKxE
4	Real time Interactions in Django: https://www.youtube.com/watch?v=3gHmfoeZ45k

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	7		15	
Understand	8		15	
Apply	35		10	10
Analyse		7	10	10
Evaluate		8		15
Create		35		15

Project Based Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project
on…….

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide
Name of the Guide
Designation
Department of Computer Science and Engineering

Project Based Learning – Student(s) – Guide – Interaction

Date		
PBL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning – Continuous Evaluation

Batch No.	Name	USN	Marks assigned	Remarks by the guide on the progress of the project

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET							
Batch No.	Name of the Student	USN	**Phase I (25 Marks)**		**Phase II (25 Marks)**		**Final CIE Marks (Phase I & Phase II) (50 Marks)**
			Abstract / Understanding of the Project (5 Marks)	Analysis & Design (20 Marks)	Implementation (20 Marks)	Demonstration (5 Marks)	

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning Outcomes

Sl.No	Batch No.	Name of Students	USN	Domain	Outcomes

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical (Internal Examiners only)

Semester	**:**	**4th**				
Course Title	**:**	**Programming with Git**				
Course Code	**:**	**23CSE47**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical – Experiential**				
Category	**:**	**AEC**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:0**		**SEE**	**:**	**50 marks**
Total Hours	**:**	**24**		**SEE Duration**	**:**	**2 hrs**
Credits	**:**	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the core concepts of Git and version control.
2	Learn to manage repositories, branches, and merges.
3	Master collaboration workflows and resolve conflicts.
4	Apply best practices in version control.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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COURSE CURRICULUM

Module No.	Topics	COs
1	**Module 1: Introduction to Git** Version Control Systems (VCS) Overview, Introduction to Git, Installing Git and Setting Up, Basic Git Commands: git init, git clone, git add, git commit, git status **Experiment 1:** • Setting up Git on local machines • Creating a new repository • Making and tracking changes • Viewing the commit history	**CO1**
Pedagogy		
2	**Module 2: Working with Repositories** Remote Repositories: git remote, git push, git pull, git fetch, Cloning repositories and working with remotes **Experiment 2:** • Cloning an existing repository • Pushing changes to a remote repository **Experiment 3:** • Pulling updates from a remote repository • Exploring git fetch and git merge	**CO3**
Pedagogy		
3	**Module 3: Branching and Merging** Branching in Git: git branch, git checkout, git switch**,** Merging branches: git merge, git rebase **Experiment 4:** • Creating and switching branches • Merging branches and resolving conflicts • Rebasing branches and understanding rebase vs. merge **Experiment 5:** Write the commands to stash your changes, switch branches, and then apply the stashed changes.	**CO2**
Pedagogy		

4	**Module 4: Collaboration Workflows** Collaboration Workflows: Centralized, Feature Branch, Forking**,** Pull Requests and Code Reviews**,** Managing Conflicts and Best Practices. **Experiment 6:** • Implementing a feature branch workflow • Creating pull requests • Conducting code reviews and resolving conflicts	**CO3**
Pedagogy		
5	**Module 5: Advanced Git Concepts** Stashing Changes: git stash**,** Interactive Rebase and Amend: git rebase -i, git commit –amend**,** Git Tags and Releases: git tag**,** Undoing Changes: git reset, git revert **Experiment 7:** • Using git stash to manage work in progress • Performing an interactive rebase • Tagging commits and creating releases • Resetting and reverting changes **Experiment 8:** Write the command to display the last five commits in the repository's history. **Experiment 9:** Write the command to cherry-pick a range of commits from "source-branch" to the current branch. **Experiment 10:** a. Write the command to display the last five commits in the repository’s history. b. Write the command to list all commits made by the author ”JohnDoe” between “2023-01-01” and “2023-12-31”	**CO4, CO1, CO5**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
1	"Pro Git" by Scott Chacon and Ben Straub

2	Version Control with Git, 3rd Edition, by Prem Kumar Ponuthorai, Jon Loeliger Released October 2022, Publisher(s): O'Reilly Media, Inc.
Reference Books	
1	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013094443347369984278 2_shared/overview
2	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013301347121774592119 26_shared/overview

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply fundamental Git commands to manage and navigate a Git repository.	**Applying**	**L3**
CO2	Design and organize branches within a Git repository to facilitate parallel development and version control	**Creating**	**L6**
CO3	Implement Git commands to collaborate with others and manage remote repositories effectively.	**Applying**	**L3**
CO4	Utilize Git commands to manage tags, create releases, and perform advanced Git operations	**Applying**	**L3**
CO5	Examine and modify the Git history to maintain a clean and accurate project history.	**Analyzing**	**L4**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	**3**														
CO3			**3**												
CO4			**3**												
CO5				**3**											

Weblinks and Video Lectures (e-Resources)	
1	Git documentation: https://git-scm.com/doc

2	GitHub Learning Lab: https://lab.github.com/
3	GitLab Documentation: https://docs.gitlab.com/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	8			
Understand	7			
Apply	35			
Analyse		8		
Evaluate		7		
Create		35		

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	**4**
Understand	**3**
Apply	**18**
Analyse	**4**
Evaluate	**3**
Create	**18**

1 Credit Course – Practical

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the Semester-End Examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

- SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.

	• Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
	• Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
	• General rubrics suggested for SEE are mentioned here,
	  • Writeup-20%,
	  • Conduction procedure and result in -60%,
	  • Viva-voce 20% of maximum marks.
	SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
	• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
	• The minimum duration of SEE is 02 hours.

SOCIAL CONNECT
&
RESPONSIBILITY (SCR)

SCR- Social Connect & Responsibility

Teaching Hours/Week (L: T: P: S)	0:0:0:2
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	2
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.

Semester	**:**	**4**				
Course Title	**:**	**Universal Human Values (UHV)**				
Course Code	**:**	**23CSE48**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**SCR**				
Stream	**:**	**CSE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**1:0:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**15 hour Theory Session +15 hour Self study**		**SEE Duration**	**:**	**2 Hrs**
Credits	**:**	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Provide a formal platform for students to communicate and connect to the surrounding.
2	create a responsible connection with the society.
3	Understand the community in general in which they work.
4	Identify the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes

Teaching-Learning Process

General Instructions - Pedagogy:

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- State the need for activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills

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COURSE CURRICULUM

Contents:

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Module No.	Topics	Hours
1	**Introduction to Value Education** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations	3
Pedagogy	Introduction to Value Education- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos	
2	**Harmony in the Human Being :** Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	3
Pedagogy	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos	
3	**Harmony in the Family and Society :** Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	3
Pedagogy	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos	
4	**Harmony in the Nature/Existence :** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	3
Pedagogy	Introduction to the concepts- Chalk and talk method, Discussion, Sharing of experiences, Live Examples and videos	

5	**Implications of the Holistic Understanding – a Look at Professional Ethics :** Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.	**3**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2	The Teacher‟s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
Reference Books	
1	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.		
CO2	They would have better critical ability.		
CO3	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).		
CO4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.		

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						2	3	3	1	3		3			
CO2						2			2	3		3			
CO3						3		3				3			
CO4						3						3			

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

PEDAGOGY:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

Duration :

A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per guidelines of scheme & syllabus.

Continuous Internal Evaluation (CIE):

- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50.
- Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing
- Considering all above points allotting the marks as mentioned below

Excellent	: 80 to 100
Good	: 60 to 79
Satisfactory	: 40 to 59
Unsatisfactory and fail: <39	

Pedagogy – Guidelines:
It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl.No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Plantation and adoption of a tree:	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc….	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
2.	Heritage walk and crafts corner:	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
3.	Organic farming and waste management:	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc….	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	Water conservation: & conservation techniques	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers / campus etc…..	Site selection / proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
5.	Food walk: Practices in society	May be individual or team	Villages/ City Areas / Gramapanchayat / public associations/ Government Schemes officers/ campus etc…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

1 Credit Course – Practical + Planning

Assessment Details (both CIE and SEE)

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

Plan of Action (Execution of Activities)	
Sl.No	**Practice Session Description**
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student At the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

Weightage	**CIE – 100%**	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study-based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25	25 Marks	
Total marks for the course in each semester	100 Marks	
For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.		
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.		

Course - Skills Mapping Table

4th Semester					
Sl.No	**Name of the Course**	**Course Code**	**Course Type**	**Course Category**	**Skills attained by the students**
1	Design and Analysis of Algorithms	BCS402	Integrated	**IPCC**	1. Problem-Solving Skills 2. Analytical Thinking 3. Mathematical Skills 4. Identification of problem-solving Technique
2	Database Management Systems	BCS403	Integrated	**IPCC**	1. Data Modelling and Designing 2. SQL Proficiency 3. Development of an applications for Real World Problems
3	Full stack Development	23CSE46	Project	**PBL**	1. Front-End Development 2. Back-End Development
4	Programming with Git	23CSE47	Practical - Experiential	**AEC**	1. Version Control Fundamentals 2. Collaboration and Workflow 3. Problem-Solving and Debugging