DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus III Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Information Science and Engineering

3rd 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 challenges.
- 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

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope.

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

M1: To deliver quality technical training on software application domain.

M2: To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.

M3: To inculcate research practices in teaching thus ensuring research blend among students.

M4: To ensure more doctorates in the department, aiming at professional strength.

M5: To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.

M6: To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.
PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.
PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

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. **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: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.
PSO 2: Meet the industry requirements in adapting to cutting edge technologies.
PSO3: Develop business and entrepreneurial ideas to support society requirements.

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	
				L	T	P	S	(Hrs/week)	
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/UHV	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

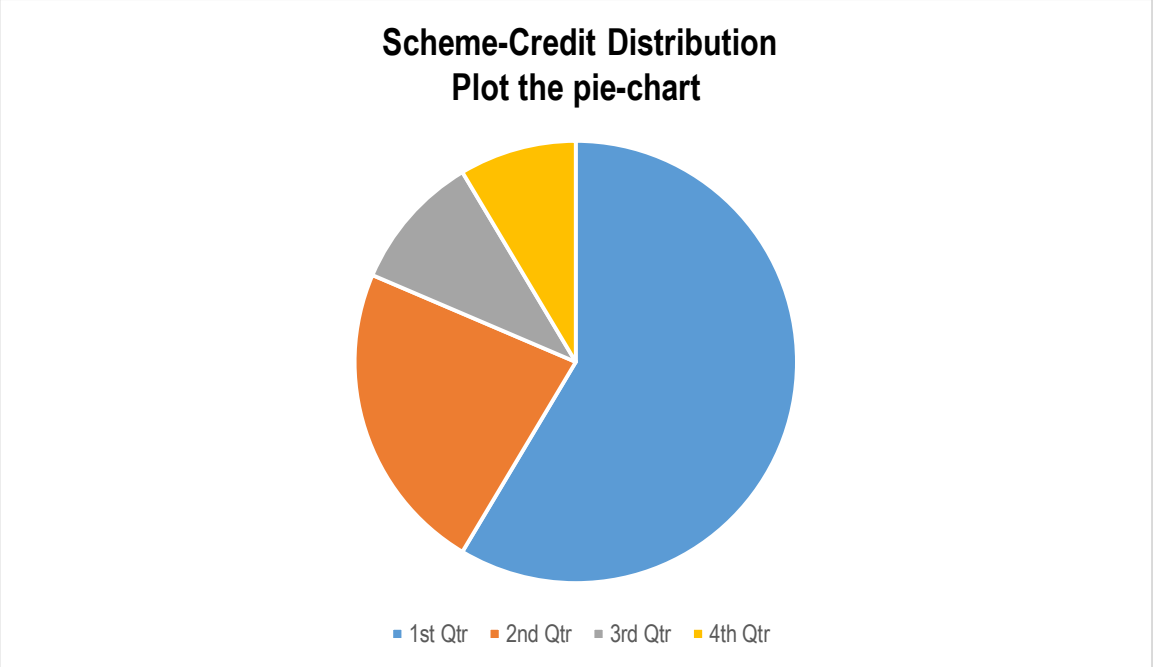
3rd Sem & 4th Sem

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/UHV	--	--	100%	--
9	NCMC	--	--	--	100%
Total Percentage		**53%**	**47%**	**13%**	**13%**

Scheme Distribution

Department of Information Science & Engineering - 3rd Semester

Course Component	Credits	% of Credits
Basic Science (BS)		
Engineering Science (ES)		
Humanities (HU)	3	
Program core (PC)	3 + 3	
Program core Integrated (PCI)	4 + 4	
Program core exclusive Lab	2	
Program elective (PE)		
Open Elective (OE)		
Internship (INT)		
Social Connect Responsibilities (SCR)	1	
Ability Enhancement course (AEC)	1	
Project (PR)		
Total	**21**	**100**



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

3rd SEMESTER: Information Science & Engineering (ISE)

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	BIS302	Data Structures and Applications	IPCC-1	ISE	ISE	3	0	2	0	5	4	3	50	50	100
3	BIS303	Digital Design and Computer Organization	IPCC-2	ISE	ISE	3	0	2	0	5	4	3	50	50	100
4	BIS304	Software Engineering and Project Management	PCC-1	ISE	ISE	3	0	0	0	3	3	3	50	50	100
5	BIS305	Operating Systems	PCC-2	ISE	ISE	3	0	0	0	3	3	3	50	50	100
6	BIS306	Web Programming	PBL	ISE	ISE	0	2	0	2	4	2	2	50	50	100
7	BIS307	Research Methodology & IPR	AEC	ISE	ISE	0	0	2	0	2	1	2	50	50	100
8	BSCK308	Social Connect and Responsibility	SCR	BSC	Any Dept.	0	0	2	0	2	1	1	100	-	100
9	BYOK309	Yoga	NCMC*		PD	1	0	0	0	1	0	0	-	-	-
	BNSK309	NSS			NSS	1	0	0	0	1	0	0	-	-	-
	BPEK309	Physical Education			PD	1	0	0	0	1	0	0	-	-	-
					Total	**16**	**2**	**8**	**2**	**28**	**21**		**450**	**350**	**800**

* **Non-Credit Mandatory Course**

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
1.	List of Existing Elective Courses	No Elective Course in 3rd Semester
2.	List of New Existing Elective Courses	No Elective Courses in 3rd Semester
3.	List of New Industry Aligned Courses	1. Web Programming 2. Advanced Python Programming with Data Visualization

3rd SEMESTER

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Linear Algebra and Discrete Mathematics**				
Course Code	:	**BMATA301**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Course Category	:	**BSC**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50 Marks**
Teaching hour/week (L:T:P:S)	:	**2:2:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3 Hours**
Credits:	:	**03**				

Course Learning Objectives: Students will be taught

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

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	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
Pedagogy	Chalk and board, group discussion, ppt, videos	

Text Books	
Books (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	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
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 Outcome: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the basic concepts of Linear Algebra and Discrete Mathematics	**Understand**	**L2**
CO2	**Apply** techniques of Linear Algebra and Discrete Mathematics to solve Engineering Problems	**Apply**	**L3**
CO3	**Analyze** Engineering problems using Linear Algebra and Discrete Mathematics	**Analyze**	**L4**
CO4	**Develop** mathematical solutions to various real time problems using MATLAB	**Evaluate**	**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)	
1	https://youtu.be/9h_Q-R6sXbM?si=PGTNmtJNzEWxQOQS
2	https://youtu.be/9MCjyQSRmR8?si=fToiea0CcJxnH7kz
3	https://youtu.be/oaOm2pnKkyY?si=HonXdjTwda_9lBL3
4	https://youtu.be/Lj9Awpd5ltc?si=qeviX5wRiQxiWCEL

Assessment Pattern (both CIE and SEE)

Applied Science Courses								
4 credits - 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**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module - 1 , 2 and Module 3 half	50	(50+50) / 2	**25**	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module – 3 half & 4 and 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	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		50				
	Total CIE Theory					**50**	20	Scale down Marks of IAT and CCA to 50

SEE		Theory exam	Entire theory syllabus including questions from lab component	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.				

	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 of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only. **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. **Possible continuous and comprehensive assessment:** 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, storytelling. The assessment of these techniques can be either based on Quiz or rubrics. The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC). **Continuous Internal Evaluation (CIE):** The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**. **CIE for the theory component of the IC** **Internal Assessment test:** **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** Three Tests each of **50 Marks** scaled down to **25 Marks** • First test after 8th week of the semester (syllabus completion of 50%) • Second test after 14th week of semester (syllabus completion of 50%) The average score of three test is taken and scaled down to **15 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**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction (Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 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 **10 Marks.**
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**
- 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.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module

	summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 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 two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2		CCA-1	CCA-2	
	50 Marks	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

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5	5	5	10	30	20%
CO2	15	15	15	15	30	90	60%
CO3	5	5	5	5	10	30	20%
CO4							
CO5							
CO6							
Total	25	25	25	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-3**	**Module-4**	**Module-5**		
CO1	**5**	**--**	**--**	**--**	**--**	**5**	**10%**
CO2	**5**	**5**	**10**	**5**	**10**	**35**	**70%**
CO3	**--**	**5**	**--**	**5**	**--**	**10**	**20%**
CO4	**--**	**--**	**--**	**--**	**--**	**--**	**--**
CO5	**--**	**--**	**--**	**--**	**--**	**--**	**--**
CO6	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Total	**10**	**10**	**10**	**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 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 (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 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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Data Structures and Applications**				
Course Code	:	**BIS302**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC-1**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50**
Total Hours	:	**40 Theory Hours + 20 Practical Hours = 60 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamentals of data structures and their applications.
2	Apply different data structures to solve given problems.
3	Analyze the given problem and identify the appropriate data structures to be used.
4	Evaluate the trade-offs of different data structures in different application scenarios.
5	Design solutions for the real-world applications using suitable data structure.

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.

DSATM

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

Module No.	Topics	Hours
1	**Basic Concepts:** Introduction to Data Structures, Types of Data Structures, Applications of Data Structures, Pointers, Dynamic Memory Allocation. **Arrays and Structures:** Arrays, Dynamic Allocated Arrays, Structures and Unions, Polynomials, Sparse Matrices, Representation of multidimensional arrays. **Textbook 1:** Chapter 1:1.2 ; Chapter 2: 2.1 - 2.6 **Textbook 2**: Chapter 3:3.4-3.6	**8 Hours**
Pedagogy	**Blended Learning**	
2	**Stacks:** Stacks, Stacks Using Dynamic Arrays, Evaluation of Expressions. **Queues:** Queues, Circular Queues using Dynamic Arrays, Priority Queues, Double-Ended Queues. **Textbook 1:** Chapter 3: 3.1 - 3.6(excluding 3.5) **Textbook 2: Chapter 7.6-7.7**	**8 Hours**
Pedagogy	**Game-Based Learning**	
3	**Linked Lists:** Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Polynomials, Additional List Operations, Sparse Matrices, Doubly Linked Lists. **Textbook 1:** Chapter 4: 4.1 - 4.8 (excluding 4.6)	**8 Hours**
Pedagogy	**Role play**	
4	**Trees:** Introduction, Binary Trees, Binary Tree Traversals, Heaps, Binary Search Trees, Red-Black Trees, Splay Trees. **Textbook 1:** Chapter 5: 5.1 - 5.3, 5.6 - 5.7 ; Chapter 10: 10.3 - 10.4	**8 Hours**
Pedagogy	**Problem-Solving**	
5	**Graphs:** The Graph Abstract Data Type, Elementary Graph Operations. **Hashing:** Introduction, Static Hashing, Dynamic Hashing. **Textbook 1:** Chapter 6: 6.1 - 6.2, 8.1 - 8.3	**8 Hours**

Pedagogy	Peer Learning	

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

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Develop a C Program to store movie Data with the fields: Title, Genre, Actor, Actress, and rating in an appropriate data structure.	CO5
2	Given a mathematical expression *exp*, write a program to examine whether the parentheses in the expression are balanced.	CO5
3	Implement a program in C to convert an Infix Expression to a Postfix Expression. The program should support both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power), and alphanumeric operands.	CO5
4	Implement a program in C for the following Stack applications: a. Evaluation of Suffix/Postfix expression with single digit operands and operators: +, -, *, /, %,^. b. Assume we have three rods (A, B, and C) and N disks of different diameters. Initially, all the disks are on rod A, so the smaller disk is always on top of the larger disk. The objective of the puzzle is to move all the disks to another rod (here considered C), obeying the following simple rules: i. Only one disk can be moved at a time. ii. Each move consists of taking the topmost disk from one of the rods and placing it on top of another rod. iii. No disk may be placed on top of a smaller disk.	CO5
5	Develop a C program to simulate the working of a multi-player game. i. Each player gets n turns. ii. Each player rolls a die during his turn. iii. The number rolled by the die is added for each player. iv. At the end of n turns, the player with the maximum total wins.	CO5
6	Develop a program in C to read a polynomial of the form $a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots\ldots\ldots + a_1x + a_0$ (Ex: $6x^4+3x^3+3x^2+2x+1$) using a Singly Linked List (SLL). Implement functions to display and evaluate the polynomial by taking the value of 'x' from the user.	CO5
7	Develop a program in C to create a Doubly Linked List (DLL) of Student data with the fields: Name, USN, Sem, and CGPA supporting different operations and display the status after each operation.	CO5

<table>
<tr><td>8</td><td>Implement a program in C to store ‘n’ integers in a Binary Search Tree (BST). Search the BST for a given element (KEY) and display the number of accesses required to find the key. Display the elements of the BST using inorder, preorder, and postorder traversal.</td><td>CO5</td></tr>
<tr><td>9</td><td>Develop a C program to implement a road map for N Cities. Display the Depth-First Search(DFS) and Breadth-First Search(BFS) traversals for the graph.</td><td>CO5</td></tr>
<tr><td>10</td><td>Develop a C program to store employee details (Employee ID: eid and Employee Name: ename) into a hash table using a hash function H: K →L as H(K)=K mod m (remainder method) where K is the Key(eid) and m is the Hash Table size. Implement linear probing to resolve any collisions.</td><td>CO5</td></tr>
<tr><td colspan="3">Open-ended Programs</td></tr>
<tr><td>1</td><td>Consider two players - A and B. ‘N’ Pots of gold are arranged in a line, each containing some gold coins. The players can see how many coins are in each gold pot, and each player gets turns in which the player can pick the coins from a pot from either end of the line. The winner is the player who has a higher number of coins at the end. Develop a program to solve the pots of gold game problem.</td><td>CO5</td></tr>
<tr><td>2</td><td>You are given a set of n jobs where each has a deadline and profit associated with it. Each job takes one unit of time to complete, and only one job can be scheduled at a time. We earn the profit associated with the job if and only if the job is completed by its deadline. Find the job scheduling of the given jobs that ensure maximum profit.
Input
<table><tr><td>Job id</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>deadline</td><td>2</td><td>1</td><td>2</td><td>1</td><td>3</td></tr><tr><td>profit</td><td>100</td><td>19</td><td>27</td><td>25</td><td>15</td></tr></table></td><td>CO5</td></tr>
<tr><td>3</td><td>Develop a program to implement password encryption using a suitable data structure.
i. Store n username and encrypted passwords in a suitable data structure.
ii. Display the username and the encrypted password.
iii. Provide a login option to the user.
iv. Display login success/ failure message based on the validity of the password.</td><td>CO5</td></tr>
</table>

4	Create a directed graph with *n* nodes. Print the distance to all reachable nodes from the given source. Check if the graph is connected or not.	**CO5**
5	Assume you are using a web browser. Store the URLs(links) you visited in a data structure of your choice. Implement Back/Forward Navigation such that choosing back should take the user to the previous page and forward should take to the next page visited in the web browser.	**CO5**

Textbooks	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Fundamentals of Data Structures in C, Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Universities Press, 2nd Edition, 2018.
2	Data Structures using C, E Balaguruswamy , Mc-Graw Hill Education Pvt. Ltd.,2013
Reference Books	
1	Data structures and algorithm analysis in C, Mark, Allen Weiss, Pearson Education, 2nd Edition, 2020.
2	Data Structures & Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Pearson Education India, 1st Edition, 2002.
3	Data Structures Using C and C++, Yedidyah Langsam , Moshe J Augenstein , Aaron M Tenenbaum, Pearson Education, 2nd edition, 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 concepts of Data Structures and their applications.	**Understand**	**L2**
CO2	**Apply** the concepts of linear and non-linear Data Structures to solve a given problem.	**Apply**	**L3**

CO3	**Analyze** the given problem and use appropriate Data Structures like the stack, queue, linked lists, trees, graphs, and hash tables.	**Analyze**	**L4**
CO4	**Assess** the efficiency and appropriateness of various data structures in solving complex, real-world problems.	**Evaluate**	**L5**
CO5	**Design** solutions for real-world problems using appropriate Data Structures.	**Create**	**L6**

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**												**3**	**3**	
CO3		**3**											**2**	**3**	
CO4				**3**					**3**	**2**			**2**	**3**	
CO5			**3**						**3**				**2**	**3**	

List of AI Tools to be Used (Not limited to)
Interactive DS, ED Applets : Shows execution traces and behavior of structures and for teaching sorting, graphs, trees

Weblinks and Video Lectures (e-Resources)	
1	https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html (Virtual Lab)
2	https://nptel.ac.in/courses/106102064
3	https://archive.nptel.ac.in/courses/106/106/106106130/
4	https://academicearth.org/computer-science/
5	https://online.vtu.ac.in/course-details/Skill-enhancement-with-Data-structure-algorithm-C-language-822203
6	https://online.vtu.ac.in/course-details/Data-Structures-and-Applications
7	https://www.geeksforgeeks.org/data-structures/?ref=lbp

8	https://www.w3schools.com/dsa/dsa_intro.php
9	https://www.youtube.com/watch?v=BBpAmxU_NQo
10	https://www.youtube.com/watch?v=8hly31xKli0
11	https://www.youtube.com/watch?v=MtVZAXepMPM
12	https://www.classcentral.com/course/udemy-data-structures-stack-queue-linkedlist-55316
13	https://onlinecourses.swayam2.ac.in/cec19_cs04/preview
14	https://www.udemy.com/course/datastructurescncpp/?couponCode=LETSLEARNNOWPP
15	https://www.geeksforgeeks.org/courses/dsa-self-paced?itm_source=geeksforgeeks&itm_medium=main_header&itm_campaign=courses

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	5	-	10	-	10
Understand	5	5	20	-	15
Apply	20	25	20	20	25
Analyze	10	10	-	10	-
Evaluate	10	10	-	5	-
Create	-	-	-	15	-

CIE Course Assessment Plan

CO's	**Marks Distribution**		**Weightage**

	Test-1			Test-2			Total Marks	
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5				5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4		5	5	5	5		20	20%
CO5								
Total							100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5		5	5	10	10%
CO2	5	10	10	10	5	40	10%
CO3		5		5		10	40%

CO4		10	5	5		20	10%
CO5	2	2	2	2	2	10	20%
Total	12	32	17	27	12	100	10%

Dayananda Sagar Academy of Technology & Management

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Semester	**:**	**III**				
Course Title	**:**	**Digital Design and Computer Organization**				
Course Code	**:**	**BIS303**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC-2**				
Stream	**:**	**Information Science and Engineering**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40 Theory Hours + 20 Practical Hours = 60 Hours**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Understand** the requirement of digital system and the basic structure of computer.
2	**Apply** combinational and sequential circuits in the design of digital systems.
3	**Analyze** digital circuits, encompassing storage elements and different computer architectures, to gauge their operational effectiveness.
4	**Demonstrate** different data types on simple arithmetic and logical unit and the functions of basic processing unit, Parallel processing.
5	**Design** digital circuits and create corresponding HDL codes.

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)**.

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

COURSE CURRICULUM

Module No.	Topics	Hours
1	**BASIC CONCEPTS OF DIGITAL SYSTEMS:** Sum-of-Products simplifications, Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions, Product-of-sums simplifications, NAND and NOR Implementation, Simplification by Quine-McClusky Method. **Introduction to HDL:** HDL Implementation Models. **Textbook 1**: Chapter 3: 3.1, 3.2 ,3.3 ,3.4 ,3.5,3.6,3.9	8
Pedagogy	Problem Solving	
2	**DESIGN OF COMBINATIONAL LOGIC CIRCUITS:** Introduction, Combinational Circuits, Decimal Adder; Decoders, Encoders; Multiplexers, De-multiplexers; Magnitude Comparator; HDL Models of Combinational Circuits. **SEQUENTIAL CIRCUITS-I:** Introduction, Sequential Circuits, Storage Elements: Latches, Flip-Flops: SR, JK, D, T and Master-Slave Flip-Flop – Characteristic table and equation. **Textbook 1**: Chapter 4: 4.1, 4.2 ,4.6 ,4.8 ,4.9, 4.10,4.11,4.12 ; Chapter 5: 5.1,5.2,5.3,5.4	8
Pedagogy	Virtual Lab, Think Pair and Share	
3	**SEQUENTIAL CIRCUITS-II:** Registers-Types of Registers, Asynchronous-Ripple Counter and Synchronous Counters. **HDL MODELS OF SEQUENTIAL CIRCUITS:** Flip-flop, Register and Counters. **Textbook 1:** Chapter 5: 5.6 ; Chapter 6: 6.1, 6.2, 6.3, 6.4,6.6	8
Pedagogy	Problem Solving, Virtual Lab	
4	**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.	8

	Textbook 2: Chapter 1: 1.2, 1.3, 1.4, 1.6 ; Chapter 2: 2.2, 2.3, 2.4, 2.5	
Pedagogy	Poster Presentation	
5	**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. **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. **Textbook 2:** Chapter 4: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4 ;Chapter 5: 5.4, 5.5.1 ;Chapter 7: 7.1, 7.2	**8**
Pedagogy	Poster Presentation	
	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	

List of Programs:

Sl. No.	Experiments/Programs Simulation packages preferred: Multisim, Modelsim, PSpice or any other relevant	COs
1	a. Given a 4-variable logic expression, simplify it using appropriate technique using basic gates. b. Design and develop the HDL code for a 4-variable logic expression. Simulate and verify it's working.	**CO5**
2	a. Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC. b. Design and develop the HDL code for an 8:1 multiplexer. Simulate and verify it's working.	**CO5**
3	a. Design and verify the Truth Table of 3×8 decoder using basic logic gates. b. Design and develop the HDL code for a 3×8 decoder. Simulate and verify it's working.	**CO5**
4	a. Design and verify the Truth Table of 3×8 encoder using basic logic gates. b. Design and develop the HDL code for a 3×8 encoder. Simulate and verify it's working.	**CO5**

5	a. Design and verify the Truth Table of 3-bit Parity Generator and 4-bit Parity Checker using basic Logic Gates with an even parity bit. b. Design and develop the HDL code 3-bit Parity Generator. Simulate and verify it's working.	**CO5**
6	a. Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth-table. b. Design and develop the HDL code for D Flip-Flop with positive-edge triggering. Simulate and verify it's working.	**CO5**
7	a. Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working. b. Design and develop the HDL code for mod-8 up counter. Simulate and verify it's working.	**CO5**
8	Design and implement an asynchronous counter using decade counter IC to count-up from 0 to n (n<=9) and demonstrate on 7-segment display (using IC- 7447).	**CO5**
Open ended Programs **Design a 4/8-bit CPU using the LOGISIM simulator, for the following specifications.**		
1	Implement the following instructions namely: MOV, ADD, SUB, LOAD, STORE, AND, XOR, NOT, BRANCH, BRANCH ON CONDITION.	**CO4**
2	Result to be displayed on 7-segment displays / reg tab of LOGISIM	**CO4**
3	ALU (to support 4-bit integer arithmetic operations & 4-bit logical operations)	**CO4**
4	Instruction Register (Assume instruction size as 16 bit)	**CO4**
NOTE: Students can utilize this link to enhance their understanding		
https://cse11-iiith.vlabs.ac.in/		

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	"Digital Design with an Introduction to Verilog Design", M. Morris Mano & Michael D. Ciletti, 5e, Pearson Education, 2013
2	"Computer Organization", Carl Hamacher, Zvonko Vranesic, SafwatZaky, 5th Edition, Tata McGraw-Hill.,2002
Reference Books	
1	Digital Principles and Design, Donald D.Givone, Tata McGraw-Hill, 2003.
2	Digital Principles and Applications, Donald P Leach, Malvoni, GautamSaha Tata McGraw Hill, 7th Edition 2010
3	Fundamentals of logic design, Charles H Roth, Larry N. Kinney, Cengage Learning, 7 th Ed., 2014.

4	Computer Organization and Design, David A. Patterson and John L. Hennessy, Elsevier, 5th Edition, 2014
5	William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.

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 functionalities of binary logic system and fundamentals of computer organization.	Understand	L2
CO2	**Apply** principles of combinational and sequential digital systems to optimize circuits and ideologies of machine instructions in computer organization.	Apply	L3
CO3	**Analyze** principles of storage elements and registers and examine input organizations of computer systems.	Analyze	L4
CO4	**Evaluate** functionality and efficiency of different counters on storage elements and appraise the functions of register transfers and ALU operations of basic processing unit.	Evaluate	L5
CO5	**Design** digital circuits and develop corresponding HDL codes.	Create	L6

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					3						
CO5			3		3							3	2		

List of AI Tools to be Used (Not limited to)
ChatGPT, Model Sim, Arduino Uno for hardware implementation. Practical Hands-on session using Arduino Uno Board

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=wk6O1OuAZn0&list=PLwdnzlV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=4 (nptel)

2	https://www.youtube.com/watch?v=QXOVwIoPGsM&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=9
3	https://www.youtube.com/watch?v=PqhTjBdiMk4&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=10
4	https://www.youtube.com/watch?v=mv-3hPgkNzM&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=12
5	https://www.youtube.com/watch?v=YXzgX8gyMFs&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=23
6	https://www.youtube.com/watch?v=9KzOApr5gKw&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=24
7	https://www.youtube.com/watch?v=qaTUzzysVew&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=27
8	https://www.youtube.com/watch?v=Ubp_L-7lucw&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=28
9	https://www.youtube.com/watch?v=3Jppx70tVp0&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=30
10	https://www.youtube.com/watch?v=POKtkWJI6KU&list=PLwdnzlV3ogoVlY7iVqr-FhWUQEX7JDdiP&index=34
11	https://www.youtube.com/watch?v=Y17TLZCSe4M&list=RDQMbn7C5WgGghA&index=24
12	https://www.youtube.com/watch?v=4goj-ajnpOQ&list=RDQMbn7C5WgGghA&index=1
13	https://www.youtube.com/watch?v=p9wxyIx-j-c&list=PL1A5A6AE8AFC187B7&index=12
14	https://cse11-iiith.vlabs.ac.in/
15	https://nptel.ac.in/courses/108105113

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	05	0	0	0	0
Understand	15	10	0	0	0
Apply	25	25	0	0	20

Analyse	05	15	0	0	15
Evaluate	0	0	25	25	0
Create	0	0	25	25	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	0	0	0	0	10	10	20	20%
CO2	10	20	10	0	5	5	50	50%
CO3	0	10	10	10	0	0	30	30%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	10	30	20	10	15	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10+5%
Understand	20+5%
Apply	25+5%
Analyze	25+5%
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	0	0	0	0	10	10	20	20%
CO2	10	20	10	0	5	5	50	50%
CO3	0	10	10	10	0	0	30	30%
CO4	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-
Total	10	30	20	10	15	15	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) - II	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
		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	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Software Engineering & Project Management**				
Course Code	:	**BIS304**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC-1**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L: T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hours**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Illustrate the different process models and Software development lifecycle.
2	Apply concepts of Software Planning and Software Design techniques.
3	Analyze capabilities of various tools to assist in the software development activities.
4	Develop robust software design and software project plan from requirement gathering to implementation.

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	**Introduction to Software Engineering:** The nature of Software, The unique nature of WebApps, Software Engineering, The Software Process, The Software Engineering practice, The Software myths. **Process Models:** A generic process model, Process assessment and improvement, Prescriptive process models, Waterfall model, Incremental process models, Evolutionary process models, Concurrent models, Specialized process models. **Textbook 1: Chapter 1: 1.1 - 1.7: Chapter 2: 2.1 -2.4**	**8 Hours**
Pedagogy	**Roleplay**	
2	**Software Requirement Analysis and Specifications**: Functional and Non-Functional, User, System – Requirement, Software Requirement Documents. **Requirement Engineering Process:** Requirements Elicitation and Analysis, Requirement Validation and Requirement Management. **System Model:** Context Model, Behavioural model, Data Model, Object Model, Structured Model. **Textbook 2: Chapter 4:4.1 -4.7: Chapter 5:5.1-5.5**	**8 Hours**
Pedagogy	**Think Pair and Share**	
3	**Software Design**: Architectural Design: Design decisions, Architectural views, Architectural patterns and architectures. **Object Oriented Design**: Object oriented design using UML, Design patterns, Implementation issues, Open-source development.	**8 Hours**

	Textbook 2: Chapter 6:6.1-6.4: Chapter 7: 7.1-7.4	
Pedagogy	**Problem Solving using various Design Techniques**	
4	**Introduction to Project Management:** Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices. **Textbook 3: Chapter 1: 1.1 to 1.17**	**8 Hours**
Pedagogy	**Demonstration**	
5	**Software Quality:** Introduction, The place of software quality in project planning, Importance of software quality, Defining software quality, quality models, ISO 9126, product and process metrics, product versus process quality management, Quality Management systems, process capability models, techniques to enhance software quality, testing, Software reliability, quality plans. **Textbook 3: Chapter 13: (13.1 to 13.14)**	**8 Hours**
Pedagogy	**Case study**	
	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	Software Engineering-A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill,7th Edition, 2010.

2	Software Engineering, Ian Somerville, Pearson Education,9th Edition ,2011.
3	Software Project Management, Bob Hughes, Mike Cotterell, Rajib Mall,6th Edition, McGraw Hill Education, 2018.
Reference Books	
1	Software Engineering theory and Practice, Shari Lawrence Pfleeger, Joanne m Alec, Pearson Education ,3rd Edition,2006.
2	Fundamentals of Software Engineering, Rajib Mall, Prentice-hall Of India Pvt Ltd.,3rd Edition, 2012.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** various Software Engineering models and its related concepts.	Understand	L2
CO2	**Apply** Software Engineering Techniques and Design practices for Developing a Software.	Apply	L3
CO3	**Analyze** the Requirements Engineering tasks, UML diagrams, Analysis models, choose right DevOps tools, Project management Life Cycle and Software Quality	Analyze	L4
CO4	**Create** the Project plan for Software Engineering and Project Management.	Create	L5

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	3												
CO4			3		3			3	3	3	3	3	3	3	

Course Outcomes	Program Outcomes	Program Specific Outcomes
CO1	-	-
	PO1	-

CO2		
CO3	PO2, PO3	-
CO4	PO3, PO5, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2

List of AI Tools to be Used (Not limited to)
Claude AI: Coding and Executing platform

Weblinks and Video Lectures (e-Resources)	
1	https://www.pearson.com/us/higher-education/product/Sommerville-Software-Engineering-%209th-Edition/9780137035151.html
2	https://onlinecourses.nptel.ac.in/noc20_cs68/preview
3	https://swayam.gov.in/nd1_noc19_cs69/preview
4	https://nptel.ac.in/courses/128/106/128106012/
5	http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html
6	http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html
7	https://www.abebooks.com/9788120332720/Software-Engineering-Kelkar-S-A-8120332725/plp
8	https://www.wileyindia.com/pankaj-jalote-s-software-engineering-a-precise-approach.html
9	https://www.coursera.org/learn/software-processes
10	https://www.youtube.com/redirect?v=4b1D1QFE
11	http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html
12	https://nptel.ac.in/courses/128/106/128106012/

13	https://www.youtube.com/watch?v=WxkP5KR_Emk&list=PLrjkTql3jnm9b5nr-ggx7Pt1G4UAHeFIJ
14	https://www.udemy.com/courses/development/software-engineering/

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	5	-		-
Understand	5	5	10	-
Apply	20	25	20	-
Analyse	10	10	15	15
Evaluate	10	10	5	15
Create	-	-	-	20

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	-	-	-	5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4	-	5	5	5	5		20	20%
CO5	-	-	-	-	-	-		
Total							100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10%
Understand	10%

Apply	**40%**
Analyze	**10%**
Evaluate	**20%**
Create	**10%**

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	2	-	-	5	5	10	10%
CO2	5	5	5	10	10	5	40	40%
CO3	-	5	3	-	5	-	10	10%
CO4	-	4	6	5	5	-	20	20%
CO5	2	-	2	2	2	2	10	10%
Total	12	16	16	17	27	12	100	10%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Operating Systems**				
Course Code	:	**BIS305**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC-2**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40 Hours**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the structure and services of the operating system that provides to users and system.
2	Learn the various CPU scheduling algorithms, storage management and disk management concepts.
3	Examine multithreading concepts, methods for handling deadlocks and recognize the classic synchronization problems.
4	Estimate Real-Time knowledge on how programming languages, operating systems, and architectures interact and how to use each effectively

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	**Introduction to Operating Systems:** What Operating systems do? Computer System Architecture, Operating System Operations. **Operating System Structure:** Operating System Services, User Operating System Interface, System Calls, Operating-System Design and Implementation, Operating System Structure, Distributed System, Virtualization, Allocating Kernel Memory. **Textbook 1:** Chapter 1: 1.1-1.12, 1.3-1.3.3, 1.5-1.5.2 ; Chapter 2: 2.1-2.2.3, 2.3, 2.6-2.6.3, 2.7-2.7.5 ; Chapter 16: 16.1	8
Pedagogy	Collaborative Learning	
2	**Processes:** Process Concept, Process Scheduling – Scheduling Queues, Schedulers, Context Switch, Interprocess Communication, Multithreading Models. **Process Synchronization:** The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Classical Problems of Synchronization, Failures and Recovery. **Textbook 1:** Chapter 3: 3.1-3.2, 3.4 ; Chapter 4: 4.1, 4.3 ; Chapter 5: 5.1 -5.3, 5.5-5.7	8
Pedagogy	Program Solving	
3	**CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms. **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock. **Textbook 1:** Chapter 6: 6.1-6.3.4 ; Chapter 7:7.1-7.7	8
Pedagogy	Problem Solving	
4	**Memory Management**: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table. **Virtual Memory:** Background, Demand Paging, Copy on Write, Page Replacement Algorithms, Thrashing. **Textbook 1:** Chapter 8: 8.1-8.6 ; Chapter 9: 9.1-9.4, 9.6	8
Pedagogy	Poster Presentation	
5	**Secondary Storage Structure**: Mass Storage Structures; Disk Structure; Disk Attachment; Disk Scheduling - FCFS, SCAN, CSCAN, LOOK, SSTF, CLOOK, Disk Management **File system Interface**: File Concept, Access Methods, Directory Structure. **Textbook 1:** Chapter 10: 10.1-10.5 ; Chapter 11:11.1-11.3	8
Pedagogy	Case Study	

	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	Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Wiley India, 9th Edition, 2018.
Reference Books	
1	Operating Systems, A Concept-Based Approach, DM Dhamdhere, Tata McGraw-Hill, 3rd Edition, 2012,
2	An Introduction to Operating Systems: Concepts and Practice, P.C.P. Bhatt, PHI(EEE), 4th Edition, 2014.
3	Operating System: Internals and Design Principles, William Stallings, Prentice Hall, 8th Edition, 2014

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 its operations.	**Understand**	**L2**
CO2	**Apply** various concepts to solve problems related to synchronization, deadlocks, memory management, in Operating Systems.	**Apply**	**L3**
CO3	**Analyze** different algorithms of CPU scheduling, Page replacement, storage management and disk scheduling	**Analyze**	**L4**
CO4	**Evaluate** real - time knowledge on how programming languages, operating systems, and architectures interact and how to use each effectively	**Evaluate**	**L5**

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	3	2		2								3	2	
CO3	2	3	2	2	2										
CO4			3	3	2				3			3	2		

List of AI Tools to be Used (Not limited to)
Disk scheduling algorithm calculator : Tool used to solve disk scheduling problems

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f (nptel and mooc link)
2	https://www.youtube.com/watch?v=3- ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO
3	Operating System Full Course | Operating System Tutorials for Beginners (youtube.com)
4	Introduction to Operating Systems (youtube.com)
5	https://archive.nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs04/
6	https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-cs44/
7	https://archive.nptel.ac.in/noc/courses/106/
8	https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cs88/
9	https://www.youtube.com/watch?v=vBURTt97EkA&list=PLBlnK6fEyqRiVhbXDGLXDk_OQAeuVcp2O
10	https://www.youtube.com/watch?v=RozoeWzT7IM&list=PLdo5W4Nhv31a5ucW_S1K3-x6ztBRD-PNa

11	https://www.youtube.com/watch?v=9NpisfXy16o
12	https://www.youtube.com/watch?v=PYPIEgSB_Ho
13	https://www.youtube.com/watch?v=fkGCLIQx1MI
14	https://www.youtube.com/watch?v=ACsLvXuaKxw

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	05	0	0	0
Understand	15	10	0	0
Apply	25	25	0	0
Analyze	05	15	0	0
Evaluate	0	0	50	50

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	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	36	54%
CO3	0	3	3	5	10	15	34	36%
CO4	-	-	-	-	-	-	-	-
Total	14	28	8	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	05%
Understand	05%
Apply	54%
Analyse	36%
Evaluate	-

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	0	0	0	0	10	10%
CO2	9	20	5	5	10	5	36	54%
CO3	0	3	3	5	10	15	34	36%
CO4	-	-	-	-	-	-	-	-
Total	14	28	8	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	3
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-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.

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:

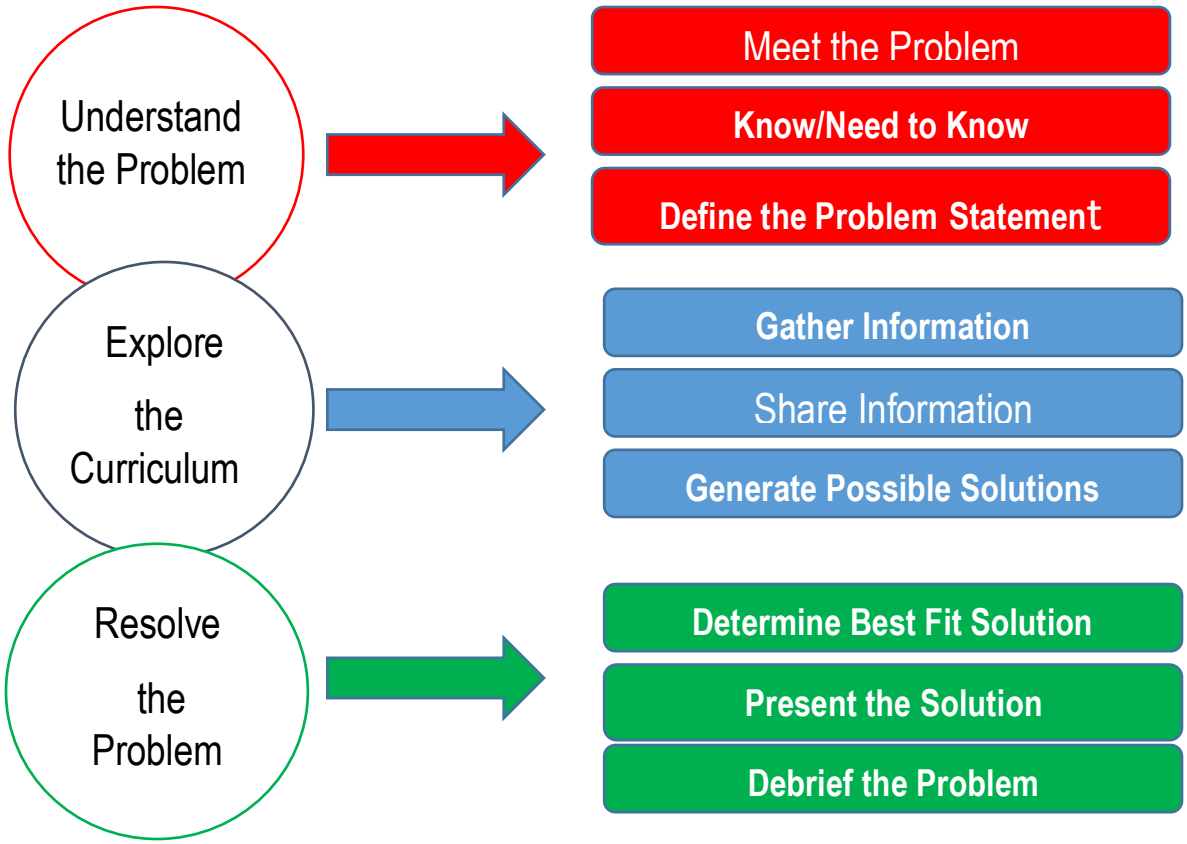
1. Phase 2 is for 11 Weeks

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.

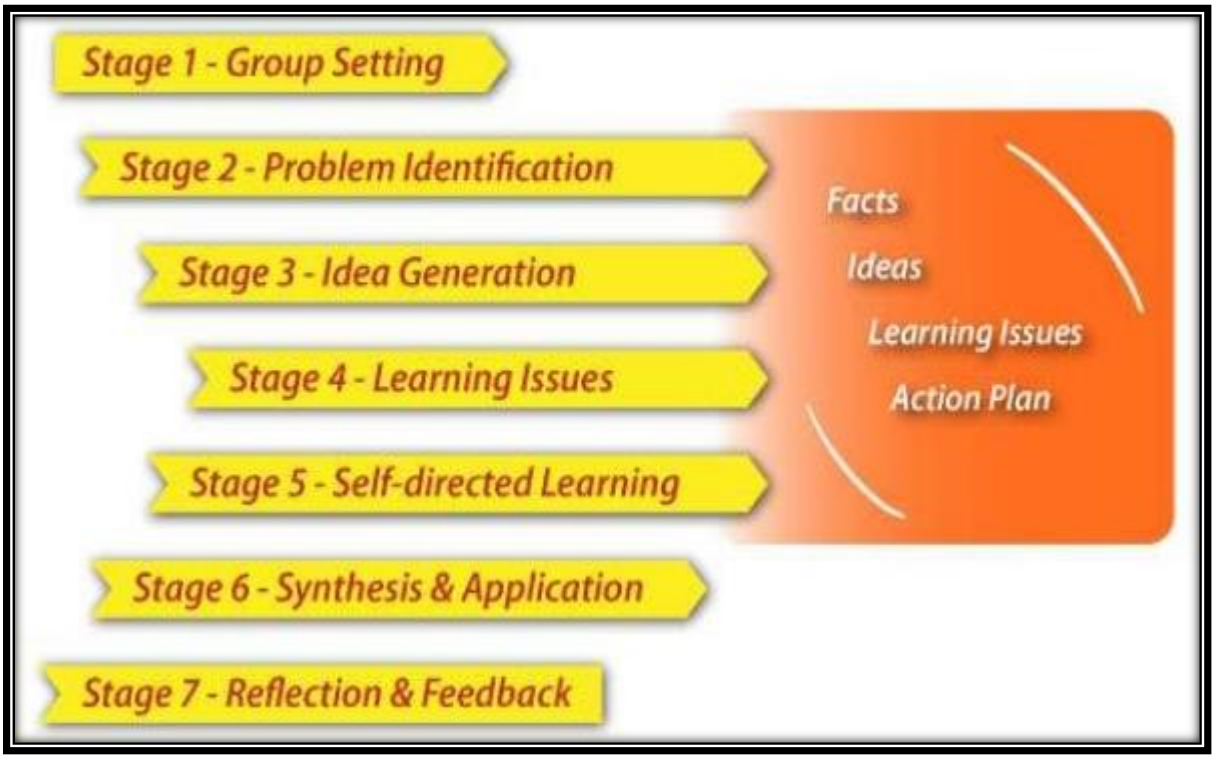
10. Obstacles/Gaps

- 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	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention.

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	III
Subject Identified for PBL	Advanced Python Programming
Prerequisite	Basic Python, Basics of Scientific computing using python, Object Oriented Concepts
Justification for the selected subject	It is required to analyze the data, building projects in different domains like machine learning, E-commerce, healthcare, social media etc.
List of possible projects	Educational Tools, Social Media Applications, Healthcare, Transport, E-Commerce, IoT Applications, Machine Learning and Artificial Intelligence, Desktop GUI Applications, Game Development, Web Scraping and Data Mining: Database Applications, Networking and Cybersecurity**. (Not limited to)**

Signature of the Guide **Signature of HOD**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Web Programming**				
Course Code	:	**BIS306**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PBL**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:2:0:2**		**SEE**	:	**50**
Total Hours	:	**30 Hours**		**SEE Duration**	:	**2 Hours**
Credits	:	**02**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Illustrate the Semantic Structure of XHTML and CSS.
2	Create forms and tables using HTML and CSS.
3	To get familiarity with the JavaScript language and Document Object Model handling of Java Script.
4	Desin Client and Server-Side programming using JavaScript and PHP.

Teaching-Learning Process

Pedagogical Initiatives:5

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	**Introduction to XHTML:** Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables. Forms, Frames in XHTML **Introduction to CSS:** Levels of style sheets, Style specification formats, Selector forms, Property value forms	5
Pedagogy	**Problem Solving**	
2	**Java Script:** General syntactic characteristics, Primitives, Operations, and expressions; Screen output and keyboard input. Control statements, Arrays, strings, Functions, Element access in JavaScript	5
Pedagogy	**Poster Presentation**	
3	**PHP:** Overview of PHP, General syntactic characteristic, Arrays, $_GET and $_POST Reading/Writing Files, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.	5
Pedagogy	**Demonstration**	
	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	WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition,2018
	Web Programming with PHP and MySQL, Max Bramer , Springer, 1st Edition,2026
Reference Books	

1	Internet & World Wide Web How to program, M.Deitel, P.J.Deitel, A.B.Goldberg, Pearson Education / PHI,2004
2	Web Programming Building Internet Applications,Chris Bates,Wiley India,3rd Edition,2006

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Apply** XHTML and CSS syntax and semantics to build web pages.	Apply	L3
CO2	**Analyze** the forms with tables using HTML and CSS.	Analyze	L4
CO3	**Design and Develop** Client-Side Scripts and Server-Side Scripts using JavaScript and PHP to insert and retrieve the contents.	Evaluate	L5
CO4	**Implement** a web based mini projects using XHTML, JavaScript and PHP	Create	L6

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		3												
CO3		3			3	3							3		
CO4				3	3	3		2	3	3	3	3		3	

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp11
2	https://www.youtube.com/watch?v=h_RftxdJTzs
3	https://onlinecourses.swayam2.ac.in/e-learning/preview/nou24_cs09
4	https://www.youtube.com/watch?v=8sXRyHI3bLw

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 ……. Engineering

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CV)

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**

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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**

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(CSE, ISE, ECE, EEE, MECH, CV)

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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

ABILITY ENHANCEMENT COURSE

EXPERIENTIAL LEARNING

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Research Methodology and Intellectual Property Right(RM&IPR)**				
Course Code	:	**BRM507x**				
Course Type (Theory/Practical/ Integrated)	:	**Theory**				
Category	:	**AEC**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**1:0:0:0**		**SEE**	:	**50**
Total Hours	:	**15 Hours**		**SEE Duration**	:	**1 Hour**
Credits	:	**01**				

Course Learning Objectives: Students will be able to:

1.	Understand the knowledge on basics of research and its types.
2.	Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
3.	Learn Ethics in Engineering Research.
4.	Discuss the concepts of Intellectual Property Rights in engineering

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2025-26 Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction**: Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship. **Tools:** Undermind, Litmaps, Bohrium, Perplexity. **Textbook1:** Chapter1	3
Pedagogy	**Think-Pair-Share**	
2	**Literature Review and Technical Reading**, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading. **Tools:** Google Scholar, IEEE Xplore, ACM Digital Library, PubMed, Scopus, Web of Science, arXiv, bioRxiv, Semantic Scholar, Connected Papers / Research Rabbit. **Textbook 1:** Chapter2	3
Pedagogy	**Literature Review Paper Writing and Demo of the same**	
3	**Paper Writing:** Identification of research problem, Paper writing as per IEEE format, Introduction to LaTeX, Plagiarism Checking **Attributions and Citations**: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations. **Tools:** Grammarly, QuillBot,LaTeX , Jenni.AI, Turnitin , Mendeley , Zotero, Scite.ai, PubMed, ResearchRabbit, Scispace, Speechify. **Text Book1:** Chapter 3	3
Pedagogy	**Case study, Patent Proposal Writing**	
4	**Introduction to Intellectual Property:** IP as a Global Indicator of Innovation, Origin of IP History of IP in India. Major Amendments in IP Laws and Acts in India. **Patents:** Rights Associated with Patents, Enforcement of Patent Rights, Inventions Eligible for Patenting, Non-Patentable Matters, Patent Infringements, Avoid Public Disclosure of an Invention before Patenting. Process of Patenting, Prior Art Search. Choice of Application to be Filed. Patent Application Forms, Jurisdiction of Filing Patent Application, Publication, Pre-	3

	grant Opposition, Examination. Grant of a Patent, Validity of Patent Protection, Post-grant Opposition, Commercialization of a Patent, Need for a Patent Attorney/Agent. **Tools:** PatentPal, WIPO Lex/GPT-based querying, Google Patents, IPfolio/TurboPatent,WIPO, TrademarkNow Advisor, DesignSearch.ai, DesignShelf, Legal Robot. **Text Book1:** Chapter 4,5,6	
5	**Copyrights and Related Rights**: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement **Trademarks**: Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India, Process for Trademarks Registration, Case Study: Coca-Cola Company vs. Bisleri International Pvt. Ltd. **Tools:** WIPO Lex, Google Scholar (Case Law), HeinOnline, LexisNexis / Westlaw, SCOPUS / Web of Science, Plagscan / Turnitin, WIPO Copyright Registration Tools, Scholarcy, Elicit **Text Book1:** Chapter 7,8	**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.	Research Methodology and Intellectual Property Rights , Dr. Santosh M Nejakar, Dr. Harish Bendigeri, ISBN 978-93-5987-928-4, Edition: 2023-24.
Reference Books	
1.	Research Methods for Engineers, David V. Thiel , Cambridge University Press, 978-1-107-03488-4
2.	Intellectual Property Rights, N.K.Acharya Asia Law House 6th Edition. ISBN: 978-93-81849-30-9
3.	Research Methodology – Methods and Techniques., C. R Kothari, Gourav Garg, New Age International Publishers.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Acquire** the knowledge of research and conduct a literature review.	Understand	L2
CO2	**Apply** the knowledge of research design, Citations, and the concepts of research methodology to a problem.	Apply	L3
CO3	**Analyze** a given problem statement using data collection methods.	Analyze	L4
CO4	**Choose** Indian patent applications, Patent laws, Gain the requirements about registration and infringements related to trademarks, & copyrights.	Evaluate	L5
CO5	**Develop** a research paper for a given problem statement.	Create	L6

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		3	2		-
CO2				2	2			3		3		3			-
CO3				2	3			3		2		3			-
CO4					2			3		3		3		2	2

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc24_ge21/preview
2	https://archive.nptel.ac.in/content/syllabus_pdf/121106007.pdf
3	https://onlinecourses.nptel.ac.in/noc21_hs08/preview

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	-	-	-	-

Understand	20	-	10	-
Apply	20	10	20	20
Analyse	10	20	10	20
Evaluate	-	20	5	5
Create	-		5	5

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5		
CO1	10	10	-	-	-	-	20	50 Marks
CO2	5	5	10	-	-	0	20	
CO3	5	5	-	10	10		30	
CO4	-	-	-	-	10	5	15	
CO5	-	-	-	-	-	15	15	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
	(90% Theory+10% Practical Questions)
Remember	-
Understand	20
Understand	20
Understand	30
Understand	15
Understand	15

SEE Course Plan

	Marks Distribution		

CO's	Module -1	Module -2	Module 2 to 2.5	Module -2.5 to 3	Module -4	Module -5	Total Marks	Weightage
CO1	5	5	5	0	**0**	0	15	50 Marks
CO2	5	5	5	0	**5**	0	20	
CO3	5	5	0	5	**5**	5	25	
CO4	5	5	0	5	5	5	25	
CO5	**0**	0	0	0	5	10	15	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1,PO2,PO5	PSO1
CO3	PO1,PO2,PO5	-
CO4	PO1,PO3	PSO2
CO5	PO1,PO2,PO3,PO5,PO12	PSO1

SOCIAL CONNECT
&
RESPONSIBILITY (SCR)

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.	Case study-based Assessment, Individual performance
6.	Sector/ Team wise study and its consolidation
7.	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="8">● 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>

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/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.	Waste management and Animal adoption	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:	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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Social Connect & Responsibility**				
Course Code	:	**BIS308**				
Course Type **(Theory/ Practical/ Integrated)**	:	**Practical**				
Category	:	**SCR**				
Stream	:	**Information Science and Engineering**		**CIE**	:	**100**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:0**		**SEE**	:	**NA**
Total Hours	:	**15 Hours**		**CIE Duration**	:	**1 Hour**
Credits	:	**01**				

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Understand social responsibility and Enable the student to do a deep drive into societal challenges being addressed by NGO(s), social enterprises & The government and build solutions to alleviate these complex social problems through immersion, design & technology.
2	Practice sustainability and creativity and provide a formal platform for students to communicate and connect with their surroundings.
3	Display planning and organizational skills and Enable to create of a responsible connection with society.

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

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

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.

Module No.	Topics	Hours
1	**Plantation and adoption of a tree:** Plantation of a tree that will be adopted for four years by a group of BE students. They will also make an excerpt either as a documentary or a photoblog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature.	8
2	**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
3	**Animal adoption and Waste Management:** Community Clean-Up Events and Pet -Adopting animals for shelters- Objectives, Visit, case study, report, outcomes, documentary or photo blog presenting the current practices.	8
4	**Water conservation:** Water Conservation Workshops about water-saving techniques, Educational Campaigns in Schools on **Protection of Local Water Resources,** - Objectives, Visit, case study, report, outcomes, documentary or photo blog presenting the current practices	8

5	**Food Walk:** Cooking without fire recipes with Tasting and Learning Sessions, Food Waste Awareness Healthy on Eating, Charitable Initiatives – Objectives, Visit, case study, report, outcomes, implementation in the campus, documentary or photo blog presenting the current practices.	8
	Pedagogical Initiatives: ● Role play: form of experiential learning ● 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	

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 environment to build and elevate nature to the society.	Understand	L2
CO2	**Analyse** by exploring the ancient monument with team, connecting to society with creative idea.	Analyze	L4
CO3	**Demonstrate** planning, organizational and management skills.	Evaluate	L5

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				3	2		3	3					
CO3			3								3	3	3		

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Information Science and Engineering

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 challenges.
- 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

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope.

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

M1: To deliver quality technical training on software application domain.

M2: To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.

M3: To inculcate research practices in teaching thus ensuring research blend among students.

M4: To ensure more doctorates in the department, aiming at professional strength.

M5: To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.

M6: To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.

PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.

PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

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. **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: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.

PSO2: Meet the industry requirements in adapting to cutting-edge technologies.

PSO3: Develop business and entrepreneurial ideas to support society requirements.

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	
				L	T	P	S	(Hrs/week)	
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	UHV	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- 4th Sem

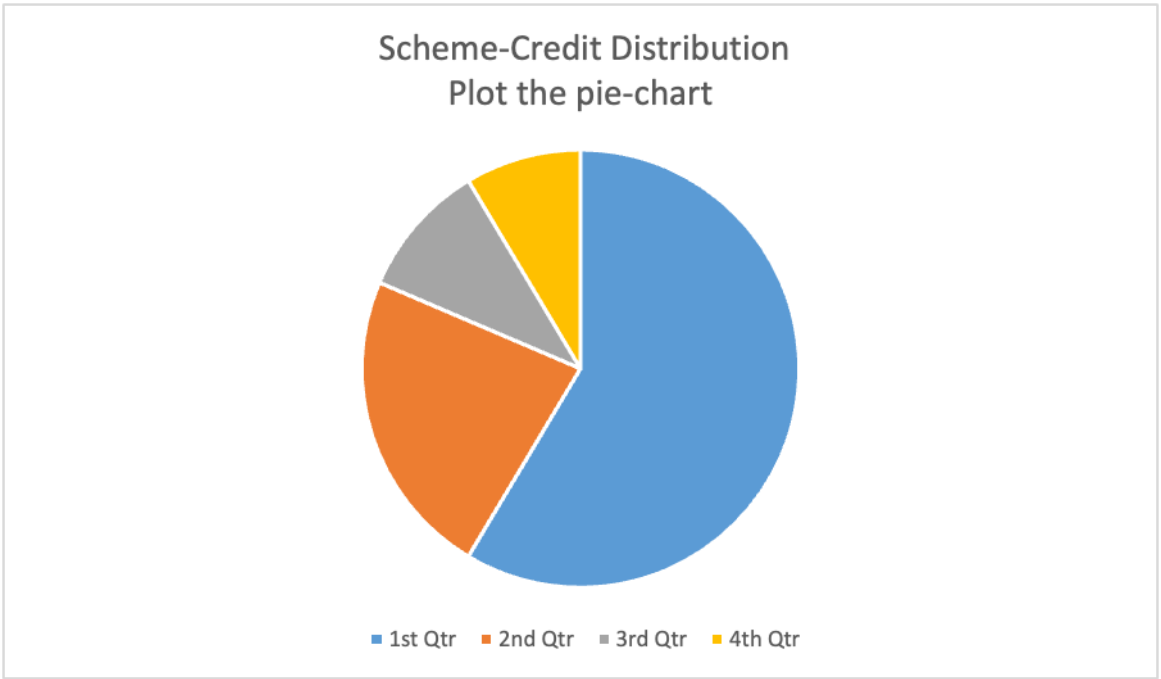
4th Sem

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/UHV	--	--	100%	--
9	NCMC	--	--	--	100%
Total Percentage		**53%**	**47%**	**13%**	**13%**

Scheme Distribution

Department of Information Science and Engineering

Course Component	Credits	% of Credits
Basic Science (BS)		
Engineering Science (ES)		
Humanities (HU)	3	
Program core (PC)	3 + 3	
Program core Integrated (PCI)	4 + 4	
Program core exclusive Lab	2	
Program elective (PE)		
Open Elective (OE)		
Internship (INT)		
Ability Enhancement course (AEC)	1	
Project (PR)	1	
Total		
	21	**100**



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CIVIL)

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

4th SEMESTER: Information Science & Engineering (ISE)

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	BMATA401	Statistics and Probability	BSC	MAT	MAT	3	0	0	0	3	3	3	50	50	100
2	BIS402	Design and Analysis of Algorithms	IPCC-1	ISE	ISE	3	0	2	0	5	4	3	50	50	100
3	BIS403	Object Oriented Programming with Java	IPCC-2	ISE	ISE	3	0	2	0	5	4	3	50	50	100
4	BIS404	Data Communication	PCC-1	ISE	ISE	3	0	0	0	3	3	3	50	50	100
5	BIS405	Database Management Systems	PCC-2	ISE	ISE	3	0	0	0	3	3	3	50	50	100
6	BIS406	Full Stack Development	PBL	ISE	ISE	0	2	0	2	4	2	2	50	50	100
7	BIS407	Competitive Programming	AEC	ISE	ISE	0	0	2	0	2	1	2	50	50	100
8	BUHK408	Universal Human Values	UHV	BSC	Any Dept.	0	0	2	0	2	1	1	50	50	100
					Total	**15**	**2**	**8**	**2**	**27**	**21**	20	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

		4th Semester
1	List of Existing Elective Courses	No Elective Courses in 4th Semester
2	List of New Existing Elective Courses	No Elective Courses in 4th Semester
3	List of New Industry Aligned Courses	1. Competitive Programming 2. Full Stack Development

4th SEMESTER

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**			
Course Title	:	**Statistics and Probability**			
Course Code	:	**BMATA401**			
Course Type (Theory/ Practical/ Integrated)	:	**Theory**			
Course Category	:	**BSC**			
Stream	:	**Common to CSE & Allied branches**	**CIE**	:	**50**
Teaching hour/week (L:T:P:S)	:	**2:2:0:0**	**SEE**	:	**50**
Total Hours	:	**40 Hours**	**SEE Duration**	:	**3 Hours**
Credits:	:	**03**			

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 to various mathematical problems.

Teaching-Learning Process

Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.

2. Show video/animated films to explain the infrastructures and the mechanism involved in the principle.

3. Encourage collaborative (Group) Learning in the class.

4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem-Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as

the ability to evaluate, generalize, and analyze information rather than simply recall it.

6. Topics will be introduced in multiple representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

9. Individual teachers can device innovative pedagogy to improve teaching-learning.

DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	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**
Pedagogy	**Chalk and board, group discussion, ppt, videos**	

Text Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
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.

Reference Books (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.

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the basic concepts of statistics and probability	**Remember, Understand**	**L2**
CO2	**Apply** techniques of statistics and probability to solve engineering problems	**Apply**	**L3**
CO3	**Analyze** engineering problems using statistics and probability	**Analyze**	**L4**

CO4	**Develop** mathematical solutions to various real-time problems using MATLAB	**Evaluate**	**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		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/

Assessment Pattern (both CIE and SEE)

Basic Science Courses								
3 credits - 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**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module – 1, 2 & 3(half module)	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 - 3(half module), 4 & 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	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		50				
	Total CIE Theory					**50**	20	Scale down Marks of IAT and CCA to 50
SEE		Theory exam	Entire theory syllabus including questions from lab component	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.				

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 of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.

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.

Possible continuous and comprehensive assessment:

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, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Continuous Internal Evaluation (CIE):

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IC

Internal Assessment test:

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

Two Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 7th week of the semester (syllabus completion of 50%)
- Second test after 14th week of semester (syllabus completion of 100%)

The average score of three test is taken and scaled down to **25 Marks.**

Continuous and Comprehensive Assessment (CCA):

Two continuous and comprehensive assessments (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 **25 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** including project demonstration/competition and report submission.
    - The evaluation of review-1 after 6th week of semester and review-2 after the 12th week of the semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **50 Marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks for conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 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 **10 Marks.**

- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**
- 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.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to a maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 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 two questions should be of the same course outcome, program outcome and Bloom's RBT level. Emphasis to be given for higher-order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

	Theory		Practical
	Continuous Assessment Tests	**Continuous Comprehensive Assessment (CCA)**	

Bloom's Category	IAT-1	IAT-2	CCA-1	CCA-2	Practical Test
	50 Marks	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

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module-3	Module-3	Module-4	Module-5		
CO1	5	5	5		5	5	25	25%
CO2	10	10	5	5	10	10	50	50%
CO3	5	5		5	5	5	25	25%
CO4								
CO5								
CO6								
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	--
Understand	5
Apply	35
Analyse	10
Evaluate	--
Create	--

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	--	--	--	--	5	10%
CO2	5	5	10	5	10	35	70%
CO3	--	5	--	5	--	10	20%
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
Total	10	10	10	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 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 (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 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 the 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

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**			
Course Title	:	**Design and Analysis of Algorithms**			
Course Code	:	**BIS402**			
Course Type (Theory/Practical/Integrated)	:	**Integrated**			
Category	:	**IPCC-1**			
Stream	:	**Information Science and Engineering**	**CIE**	:	**50**
Teaching hours/week (L:T:P:S)	:	**3:0:2:0**	**SEE**	:	**50**
Total Hours	:	**40 Theory Hours + 20 Practical Hours = 60 Hours**	**SEE Duration**	:	**3 hours**
Credits	:	**04**			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn the fundamental concept of algorithms, its types, parameters, asymptotic notation and various design techniques of algorithms.
2	Apply the appropriate data structure and algorithm design method for a specified application.
3	Inspect the problems using various algorithmic design technique 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	Design the algorithms for real various real time applications using contemporary computing languages.
5	Demonstrate the experiments using the various algorithm techniques.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. 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:** Definition of Algorithm, Fundamentals of Algorithmic Problem Solving. **Fundamentals of Analysis of Algorithm Efficiency:** Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms and Recursive Algorithms. **Performance Analysis**: Space Complexity, Time Complexity. **Textbook 1:** Chapter 1: 1.1-1.2; Chapter 2: 2.1 - 2.4; **Textbook 2:** Chapter 1:1.3.1-1.3.2.	6
Pedagogy	**Mind Mapping**	
2	**Brute Force**: Selection Sort, Bubble Sort, String Matching. Depth First Search (DFS), Breadth First Search (BFS), Applications of DFS and BFS **Decrease and conquer**: Topological Sorting, Variable size decrease algorithms: Computing a Median and the Selection Problem, Interpolation search **Divide and Conquer:** Master's Theorem, Merge sort, Quicksort, Strassen's matrix multiplication, Multiplication of large integers, **Textbook 1:** Chapter 3: 3.1- 3.2, 3.5; Chapter 4: 4.2, 4.5; Chapter 5: 5.1-5.2, 5.4.	10
Pedagogy	**Problem-Solving**	
3	**Transform and Conquer:** AVL Trees, Heaps and Heapsort **Space and Time Trade-offs:** Input enhancement in string matching: Boyer Moore Algorithm, Hashing **Textbook 1:** Chapter 6: 6.3, 6.4; Chapter 7: 7.2-7.3.	8
Pedagogy	**Think-Pair-Share (TPS)**	
4	**Dynamic Programming:** Knapsack Problem and Memory functions. Warshall's and Floyd's Algorithm, The Travelling Salesperson Problem. **Greedy Technique:** Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm,	8

	Huffman trees and codes. **Textbook 1:** Chapter 8: 8.2,8.4; Chapter 9: 9.1- 9.4; **Textbook** 2: Chapter 5: 5.9	
Pedagogy	**Poster Presentation**	
5	**Backtracking**: N-queen's problem, Sum of subset problem **Branch and bound:** Assignment problem, **Limitations of Algorithm Power**: Decision Tress, Basic concepts of P, NP and NP-Complete and NP – Hard Classes. **Algorithms as a technology:** Communication & Networking, Search engines, Machine learning, Database management, Software tools development, Data organization, GPS navigation systems. **Textbook 1:** Chapter 12: 12.1-12.2; Chapter 11: 11.2; **Textbook 3:** chapter 1: 1.2	**8**
Pedagogy	**Case Studies**	
	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
	Design and implement a C/C++ Program to	
1	Sort a given set of n integer elements using the Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator	**CO3**
2	You are managing a database of Library records where each record consists of a Book name and year. The database is unsorted. Design a program using merge sort to sort these records	**CO3**

	first by year (ascending order) and then by name (alphabetical order) for students with the same grade.	
3	Solve All-Pairs Shortest Paths problem using Floyd's algorithm.	**CO4**
4	Find the shortest paths from a given vertex to other vertices in a weighted connected graph using Dijkstra's algorithm.	**CO4**
5	Obtain the Topological ordering of vertices in a given digraph.	**CO3**
6	Solve 0/1 Knapsack problem using the Dynamic Programming method.	**CO4**
7	Solve Travelling Sales Person problem using Dynamic programming.	**CO4**
8	a. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. b. Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm.	**CO5**
9	Find a subset of a given set S = {sl , s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d.	**CO5**
10	Implement N Queen's problem using Backtracking.	**CO4**
Open-ended Programs		
1	Consider the scenario of placing wi-fi routers in a straight-line building. Determine the list of positions based on router's range and also locate the exact position where the wi-fi router can be placed to receive good communication. Decide which algorithm technique is suitable for a given scenario and implement the same algorithm using Java programming	**CO5**
2	Design a Java program by applying an optimal solution approach for Matrix Chain Multiplication in dynamic programming.	**CO5**
3	A Technical company has multiple elevators, each elevator needs to respond to requests quickly and efficiently minimizing waiting time. Design and implement an algorithm in Java programming to schedule elevator movements and optimize waiting time.	**CO5**
4	Consider the scenario of a communication network where the sensors transmit the data in a limited bandwidth channel. Design compression algorithm (Huffman Coding) to compress the sensor data to transmit in a limited bandwidth channel and implement in Java programming.	**CO5**

Text Books	
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, Pearson, 3rd Edition (Indian), 2017.
2	Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, Universities Press, 2nd Edition, 2014
3	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, 2010
Reference Books	
1	Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

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 fundamental concepts of asymptotic notations and various design techniques of algorithms	Understand	L2
CO2	**Apply** the various data structure operations in problem-solving techniques of algorithms.	Apply	L3
CO3	**Analyze** the performance and computational complexity of different algorithms.	Analyze	L4
CO4	**Evaluate** the efficiency of algorithms using contemporary computing languages.	Evaluate	L5
CO5	**Design** the solutions for various real world applications using different algorithm techniques.	Create	L6

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		3											
CO4			3												
CO5					3				3			3	3	3	

List of AI Tools to be Used (Not limited to)
Visualgo : Visualisation of algorithms as an interactive platform.

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106/101/106101060/
2	http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3	Welcome to Virtual Labs - A MHRD Govt of india Initiative (vlabs.ac.in)
4	http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html
5	http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html
6	DIJKSTRA'S ALGORITHM: Analysis & Problems -ADA BCS401 Mod4 VTU #VTUPadhai #daa #vtu#bcs401#dijkstra - YouTube
7	HUFFMAN CODING: Algorithm, Analysis & Problems - ADA BCS401 Mod4 VTU #VTUPadhai #daa #vtu #bcs401 - YouTube
8	WARSHALL'S & FLOYD'S: Algorithm, Analysis & Examples - ADA BCS401 Mod4 VTU #VTUPadhai#daa#vtu#bcs401 (youtube.com)
9	BACKTRACKING: N Queens & Subset Sum Problems - ADA BCS401 Mod5 VTU #VTUPadhai #daa #vtu #bcs401 (youtube.com)
10	BRANCH-AND-BOUND: Knapsack, TSP &Assignment Problem -ADA BCS401 Mod5 VTU #VTUPadhai #daa #vtu#bcs401 (youtube.com)
11	HORSPOOL ALGORITHM: Advanced Input Enhancement - ADA BCS401 Mod3 VTU #VTUPadhai #daa #vtu - YouTube
12	HEAPS AND HEAPSORT: Algorithm+ Problems -Transform & Conquer- ADA BCS401 Mod3 VTU #VTUPadhai#daa#vtu (youtube.com)

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests		Continuous Comprehensive Assessment		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	10	0	5	0	0
Understand	15	0	10	0	0
Apply	25	25	15	15	10
Analyse	0	15	20	10	5
Evaluate	0	10	0	10	10
Create	0	0	0	15	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	6	4	0	0	0	0	10	10%
CO2	21	10	5	0	0	0	36	36%
CO3	0	3	1	5	10	15	34	34%
CO4	-	-	-	5	10	5	20	20%
CO5	-	-	-	-	-	-	-	-
Total	27	17	6	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	10%
Apply	35%
Analyse	25%
Evaluate	10%
Create	15%

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	-	-	-	2	3	10	10%
CO2	-	-	5	3	-	2	10	10%
CO3	10	10	-	10	5	-	35	35%
CO4	-	10	10	-	10	-	30	30%
CO5	-	-	-	-	5	10	15	15%
Total	15	20	15	13	22	15	100	100%

Cos Matched with POs

COs	POs Mapped	PSOs
CO1	--	--
CO2	PO1	--
CO3	PO2, PO4	--
CO4	PO3	--
CO5	PO5, PO9, PO12	PSO1, PSO2

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**			
Course Title	:	**Object Oriented Programming with Java**			
Course Code	:	**BIS403**			
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**			
Category	:	**IPCC-2**			
Stream	:	**Information Science and Engineering**	**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**	**SEE**	:	**50**
Total Hours	:	**40 Theory Hours + 20 Practical Hours = 60 Hours**	**SEE Duration**	:	**3 Hours**
Credits	:	**04**			

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Learn the syntax and semantics of Java programming language
2	Understand Object Oriented Programming Features of JAVA
3	Apply object-oriented concepts to solve given problems
4	Analyze Inheritance, Packages, String manipulation, Exceptions, and Multithreaded programming and identify the appropriate concepts to be used.
5	Design and Develop Solutions to problems using an object programming approach.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in Java.
3. Encourage collaborative (Group) Learning for team building.
4. Include at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. 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	**Evolution and an Overview of Java:** The Bytecode, The Java Buzzwords, Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles), Using Blocks of Code, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, The Java Keywords). **Data Types, Variables, and Arrays:** The Primitive Types (Integers, Floating-Point Types, Characters, Booleans), Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Introducing Type Inference with Local Variables. **Operators:** Arithmetic Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses. **Control Statements:** Java's Selection Statements, Iteration Statements (while, do-while, for, The For-Each Version of the for Loop, Local Variable Type Inference in a for Loop, Nested Loops), Jump Statements. **Textbook 1:** Chapter 1, 2, 3, 4, 5	8
Pedagogy	**Blended Learning**	
2	**Introduction to Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection. **Methods and Classes:** Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Recursion, Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes. **Inheritance:** Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, Local Variable Type Inference and Inheritance, The	8

	Object Class. **Textbook 1:** Chapter 6,7,8	
Pedagogy	**Peer Group Learning**	
3	**Interfaces:** Interfaces, Default Interface Methods, Use static Methods in an Interface, Private Interface Methods. **Packages:** Packages, Packages and Member Access, Importing Packages. **Exceptions:** Exception-Handling Fundamentals**,** Exception Types**,** Uncaught Exceptions**,** Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions. **Textbook 1:** Chapter 9,10	**8**
Pedagogy	**Think-Pair-Share**	
4	**String Handling**: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf(), Changing the Case of Characters Within a String, joining strings, StringBuffer, StringBuilder. **Textbook 1:** Chapter 18	**8**
Pedagogy	**Mind Mapping**	
5	**Multithreaded Programming:** The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter-thread Communication, Suspending, Resuming, and Stopping Threads, Obtaining a Thread's State. **Textbook 1:** Chapter 11	**8**
Pedagogy	**Problem-Solving**	
	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 under-	

	stand 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	Develop a Java program to add TWO matrices of suitable order N (The value of N should be read from command line arguments).	CO5
2	Create a stack class capable of holding up to 10 integers, including appropriate methods for stack operations. Implement a Java main method to demonstrate how these stack operations work.	CO5
3	Implement a Java program to define a class named "Rectangle" with attributes for width and height. Include methods to compute the area and perimeter of the rectangle, and demonstrate the functionality in the main method.	CO5
4	Showcase the concept of polymorphism by designing appropriate methods, defining member data, and writing a main program to create a class named "Person" with methods getFirstName() and getLastName(). Then, create a subclass called "Employee" that introduces an additional method called getEmployeeId() and overrides the getLastName() method to include both the employee's job title and last name.	CO5
5	Develop a Java program to define an interface called “Resizable” with a method resize(int radius) to allow an object to be resized. Create a Circle class that implements the Resizable interface and overrides the resize method. Display the circle's radius before and after resizing.	CO5
6	Develop a Java program to define a package named “balance” that includes an Account class with a displayBalance() method. Import this package into a separate program to access and use the displayBalance() method of the Account class.	CO5
7	Develop a Java program that creates a custom exception for DivisionByZero. Use the try, catch, throw, and finally keywords to handle the exception.	CO5
8	Build a Java program for a banking application that throws a custom exception when a person attempts to withdraw an amount that would result in a balance lower than the minimum required balance.	CO5

9	Implement a program in Java to check whether two given strings are anagram.	**CO5**
10	Develop a Java program to search for a pattern within a given string using 'StringBuffer' class.	**CO5**
11	Implement a Java program to create and start multiple threads that concurrently increment a shared counter variable.	**CO5**
12	Build a Java program with a class "MyThread" that includes a constructor which invokes the base class constructor using super, and then starts the thread. The run method of the class will execute after this. It can be observed that both the main thread and the newly created child thread run concurrently.	**CO5**
	Open Ended Programs	
1	Develop a Java program to manage student grades. The program should enable users to input grades for multiple students and compute statistics including the average grade, highest grade, and lowest grade. It should also generate a grade report displaying student's name alongside their respective grade.	**CO5**
2	Imagine you are tasked with sorting a large dataset of records, such as a list of customer transactions, which is too extensive to fit into memory all at once. Implement a Java program to manage this task efficiently.	**CO5**
3	Create a Java program that defines an interface named "Flyable" with a method "fly_obj()". Then, implement this interface in three classes: "Spacecraft", "Airplane", and "Helicopter". Each class should provide its own implementation of the "fly_obj()" method.	**CO5**
4	You have a collection of n nuts, each of a unique size, and n bolts, each also of a unique size. Each nut pairs with exactly one bolt. Your task is to match each nut with its corresponding bolt efficiently. Develop a Java program to solve this nuts and bolts problem.	**CO5**
5	Assume you are developing a web application that processes user input to generate user profiles. Each user profile includes a name, email address, and a short bio. The application needs to ensure the following: 1. **Name Validation:** The user's name should be properly capitalized (i.e., the first letter of each word should be uppercase, while the rest should be lowercase). 2. **Email Normalization:** The email address should be normalized to lowercase to ensure consistency and avoid case sensitivity issues.	**CO5**

	3. **Bio Sanitization:** The bio should be sanitized to remove any leading or trailing whitespace, and all extra spaces between words should be reduced to a single space. Develop a Java program for the above application.	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Java: The Complete Reference, Herbert Schildt, McGraw-Hill, Twelfth Edition, November 2021, ISBN: 9781260463422
Reference Books	
1	Programming with Java, E Balagurusamy, McGraw Hill Education,6th Edition,Mar-2019, ISBN: 9789353162337.
2	Introduction to JAVA Programming, Y. Daniel Liang: Pearson Education, 11th Edition, 2018
3	Thinking in Java, Bruce Eckel, Prentice Hall, Fourth Edition, 2006 (https://sd.blackball.lv/library/thinking_in_java_4th_edition.pdf)

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 fundamental principles of object-oriented concepts for the construction of robust programs.	**Understand**	**L2**
CO2	**Apply** the knowledge of Java programming in implementing simple real-world problems.	**Apply**	**L3**
CO3	**Analyze** OOP concepts, inheritance, packages, exception handling, string handling and multithreading techniques.	**Analyze**	**L4**
CO4	**Develop** the effective programs using appropriate object-oriented feature.	**Evaluate**	**L5**
CO5	**Create** the optimal solution for the given scenario using java concepts.	**Create**	**L6**

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		3							3			
CO5	3	3	3	3	3			2	3	3	2	3	3	3	

List of AI Tools to be Used (Not limited to)
GitHub Copilot : GitHub Copilot: AI-powered tool that generates Java OOP code, simplifies repetitive tasks,

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106/105/106105191/
2	https://java-iitd.vlabs.ac.in/List%20of%20experiments.html (Virtual Labs)
3	https://nptel.ac.in/courses/106/105/106105225/
4	https://academicearth.org/computer-science/
5	https://online.vtu.ac.in/course-details/Programming-In-Java
6	Introduction to Programming In Java (by Evan Jones, Adam Marcus and Eugene Wu):
7	https://onlinecourses.nptel.ac.in/noc24_cs105/preview
8	https://www.geeksforgeeks.org/courses/category/programming-
9	https://www.udemy.com/course/java-se-programming/?couponCode=HT815INMT81324
10	https://www.w3schools.com/java/java_intro.asp
11	https://www.tutorialspoint.com/java/index.htm
12	https://www.youtube.com/@VeenaRSV
13	https://www.classcentral.com/course/java-universidad-carlos-iii-de-madrid-introductio-2813
14	https://www.youtube.com/watch?v=BGTx91t8q50
15	https://www.youtube.com/watch?v=r_MbozD32eo

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	5		10		
Understand	5	5	10		10
Apply	20	25	25		20
Analyse	10	10	5	20	10
Evaluate	10	10		20	
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	5	5				5	15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4		5	5	5	5		20	20%
CO5								
Total							100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%
Understand	15%
Apply	40%
Analyse	20%
Evaluate	10%
Create	10%

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5		5	5	10	10%
CO2	5	10	10	10	5	40	10%
CO3		5		5		10	40%
CO4		10	5	5		20	10%
CO5	2	2	2	2	2	10	20%
Total	12	32	17	27	12	100	10%

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	--	--
CO2	PO1	--
CO3	PO2	--
CO4	PO3,PO5,PO12	--
CO5	PO4,PO5,PO8, PO9,PO10,PO11, PO12	PSO1, PSO2

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**	
CIE	**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	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**IV**			
Course Title	**:**	**Data Communication**			
Course Code	**:**	**BIS404**			
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**			
Category	**:**	**PCC-1**			
Stream	**:**	**Information Science and Engineering**	**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:0:0**	**SEE**	**:**	**50**
Total Hours	**:**	**40 Hours**	**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**03**			

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Define and understand the concept of Data communication, role of protocol, the concept of layering and identify the major functions at each layer.
2	Describe how bits are represented as a signal on various types of transmission media along with switching concepts of data communication systems.
3	Demonstrate understanding of basic concepts of error detection, checking, and correction at data link layer and application to flow control protocols.
4	Demonstrate understanding of basic concepts of network layer protocols
5	Explore the internal operations of Routing Algorithms, Congestion Control Algorithms, QoS at Network Layer.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. 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**: Data Communication components, Data Representation, Data Flow. **Networks:** Distributed Processing, Network criteria, Physical Structures, Network Models, categories of Networks, Interconnection of Networks: Internetwork. **Protocols and Standards:** Protocols, Standards, Standards Organizations, and Internet Standards. **Networks Models:** Layered Tasks, The OSI Model, Layers in the OSI Model **Textbook 1:** Chapter 1:1.1,1.2,1.4; Chapter 2:2.1 - 2.3	8
Pedagogy	**Role Play**	
2	**Physical Layer and Media-Digital Transmission:** Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. **Transmission Media:** Guided Media, Unguided Media: Wireless. **Switching:** Circuit-switched Networks, Datagram Network, Virtual-Circuit Networks. **Textbook 1:** Chapter 4:4.1 - 4.3; Chapter 7: 7.1, 7.2; Chapter 8: 8.1 - 8.3	8
Pedagogy	**Problem Based Learning**	
3	**Data Link Layer:** Error Detection and Correction-Introduction, Block coding, Linear Block codes, Cyclic codes and Checksum. **Data Link control:** Framing, Flow and Error control, Protocol, Noiseless Channels, Noisy Channel, HDLC, Point-to-Point Protocol. **Multiple Access:** Random Access, Controlled Access, Channelization. **Textbook 1:** Chapter 10: 10.1 - 10.5; Chapter 11:11.1 - 11.7; Chapter 12:12.1 - 12.3	8
Pedagogy	**Flipped Classroom**	
4	**Network Layer:** Network Layer Design Issues: Store and forward packet switching, Services provided to the Transport layer, Implementation of connection-less services, Implementation of connection oriented services, The Network Layer in the Internet: the IP version 4 protocol, IP Addresses, IP Version 6, Internet control Protocols, Mobile IP, Tunnelling, Internetwork Routing, Packet Fragmentation. **Textbook 2:** Chapter 5: 5.1, 5.5 (5.5.3-5.5.5), 5.6 (5.6.1-5.6.4, 5.6.9)	8
Pedagogy	**Case Study**	
5	**Network Layer:** Routing Algorithms: The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Congestion Control Algorithms:	8

	Approaches to the congestion control, Traffic aware routing, Admission control, Traffic throttling, Load shedding. QoS: Application Requirement, traffic shaping, Packet scheduling, admission control, Integrated services, Differentiated services. **Textbook 2:** Chapter 5: 5.2 (5.2.1-5.2.5), 5.3, 5.4	
Pedagogy	**Collaborative learning**	
	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 under-stand 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	Data Communication and Network by Behrouz A. Forouzan, Mc Graw Hill, 4th Edition,2007
2	Computer Networks, Andrew S Tanenbaum, Pearson Publishers, 5th Edition, ISBN**-13** 978-0132126953, December 2010.
Reference Books	
1	Computer Networks and Internets (5th Edition), Douglas Comer
2	Networking Complete by Sybex Inc. and Sybex Inc.

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

CO	Course Outcomes	RBT Level	RBT Level
CO1	**Understand** the basics importance of internet, networks, protocols and OSI models in data communication.	**Understand**	**L2**
CO2	**Apply** various types of digital transmission techniques, switching methods, error detection and corrections for flow control algorithms used in network and data link layers.	**Apply**	**L3**
CO3	**Analyse** the various network layer design issues on internet protocols and packet fragmentation. .	**Analyze**	**L4**
CO4	**Evaluate** performance of designed protocols on real world scenarios using programming or simulation models.	**Evaluate**	**L5**

CO5	**Design** the network layer routing protocols and congestion control mechanisms to provide better QoS.	**Create**	**L6**

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	3	3	3	3	2		3	3		3		3	3	

List of AI Tools to be Used (Not limited to)
Eraser.io Cisco Packet Tracer: AI Network Diagram Generator - eraser.io, that Generate network diagrams. Cisco Packet Tracer-tool is used to simulate network and observe the real world network behaviour.

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/106105082
2	https://onlinecourses.nptel.ac.in/noc22_ee61/preview
3	https://www.nptelvideos.com/course.php?id=399
4	https://archive.nptel.ac.in/courses/106/105/106105080/
5	https://archive.nptel.ac.in/courses/106/105/106105183/

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	-	-	-	-
Understand	20	-	10	-
Apply	20	10	20	20
Analyse	10	20	10	20
Evaluate	-	20	5	5

Create	-		5	5

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10	-	-	-	-	20	50 Marks
CO2	5	5	10	-	-	0	20	
CO3	5	5	-	10	10		30	
CO4	-	-	-	-	10	5	15	
CO5	-	-	-	-	-	15	15	
Total	20	20	10	10	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	20
Analyse	30
Evaluate	15
Create	15

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	5	0	**0**	0	15	50 Marks
CO2	5	5	5	0	**5**	0	20	
CO3	5	5	0	5	**5**	5	25	
CO4	5	5	0	5	5	5	25	
CO5	**0**	0	0	0	5	10	15	
Total	20	20	10	10	20	20	100	

COs Mapped with POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1	-
CO3	PO2	-
CO4	PO2	-
CO5	PO1, PO2, PO3, PO4, PO5,PO6 PO8,PO9,PO11	PSO1, PSO2

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**			
Course Title	:	**Database Management Systems**			
Course Code	:	**BIS405**			
Course Type (Theory/ Practical/ Integrated)	:	**Theory**			
Category	:	**PCC-2**			
Stream	:	**Information Science and Engineering**	**CIE**	:	**50**
Teaching hours/ week (L: T:P:S)	:	**3:0:0:0**	**SEE**	:	**50**
Total Hours	:	**40 Hours**	**SEE Duration**	:	**3 Hours**
Credits	:	**03**			

Course Learning Objectives: Students will be able to:

Sl. No.	Course Objectives
1	Learn the strong foundation in database concepts, relational database design, NOSQL, and database security.
2	Practice SQL programming through a variety of database problems.
3	Exemplify the representation of a database system using ER diagrams and to learn normalization techniques.
4	Demonstrate the use of concurrency and transactions in database.
5	Design and build database applications for real-world problems.

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. 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.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. 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 Databases, Database Languages and Architectures:** Introduction, Characteristics of database approach, Advantages of using the DBMS approach, Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. **Data Modelling Using the Entity-Relationship Model:** High-Level Conceptual Data Models for Database Design; A Sample Database Application; Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams, Naming Conventions and Design Issues. **Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping. **Textbook 1:** Chapter 1: 1.1 - 1.6; Chapter 2: 2.1 - 2.4; Chapter 3: 3.1 - 3.7; Chapter 9: 9.1	8
Pedagogy	**Poster Presentation**	
2	**Relational Model and Relational Algebra concepts:** Relational Model Constraints and Relational Database Schemas, Update Operations and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Examples of Queries in Relational Algebra. **SQL:**SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL. **Textbook 1:** Chapter 5: 5.1 - 5.3; Chapter 8: 8.1 - 8.5; Chapter 6: 6.1-6.4	8
Pedagogy	**Think Pair and Share**	
	SQL: Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL.	

3	**Database Design Theory:** Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies – Definition, Inference Rules, Equivalence of sets of FDs, Minimal Set of FD's; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form, Fourth Normal Form, Join Dependencies and Fifth Normal Form. **Textbook 1:** Chapter 7: 7.1 - 7.4; Chapter 14 :14.1 - 14.7	**8**
Pedagogy	**Query Solving**	
4	**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. **Concurrency Control Techniques:** Two phase locking techniques for concurrency control, types of locks and system lock tables, Concurrency control based on Timestamp ordering. **Textbook 1:** Chapter 20: 20.1 - 20.6; Chapter 21: 21.1.1 - 21.1.3, 21.2.1-21.2.2	**8**
Pedagogy	**Problem-Solving**	
5	**Database Security:** Security issues, Access control based on privileges, Role Based access control, SQL Injection, Statistical Database security, Flow control, Encryption and Public Key infrastructures. **Introduction to NOSQL Databases:** Difference between SQL and NoSQL, The CAP Theorem, Document-Based NOSQL Systems and MongoDB, NOSQL Key-Value Stores, Column-Based or Wide Column NOSQL Systems, NOSQL Graph Databases. **Textbook 1:** Chapter 30: 30.1- 30.7; Chapter 24: 24.1 - 24.6	**8**
Pedagogy	**Case Studies, Practical Based learning**	
	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	

Sl. No.	Open ended Programs	COs
1	Create a table called Employee that contain attributes EMPNO, ENAME, JOB, MGR, SALARY, ADDRESS & execute the following. 1. Add a column commission with domain to the Employeetable. 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. 6. Add primary key constraint and not null constraint to the employee table.	CO3
2	Consider the schema 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 3. Find the Maximum age from employee table. 4. Find the Minimum age from employeetable. 5. Find salaries of employee in Ascending Order. 6. Find grouped salaries of employees.	CO3
3	Consider the following schema for a Library Database: BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Programme_id, No-of_Copies) BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date) LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address) Design SQL queries to 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple	CO3

	query. 5. Create a view of all books and its number of copies that are currently available in the library.	
4	Design the core concepts on table like nested and correlated nesting queries and also EXISTS and NOT EXISTS keywords**.** Consider the schema for Company Database: EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION(DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours) Develop SQL queries to 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department 4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). 5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000.	**CO5**
5	Develop SQL Triggers for insert, delete, and update operations in a database table 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**
6	Develop NO SQL for Database and CRUD operations on database table. Install an Open-Source NoSQL Data base MongoDB & perform basic CRUD (Create, Read, Update & Delete) operations. Execute MongoDB basic Queries using CRUD operations.	**CO5**
7	Develop NoSQL database tools Create Document, column and graph-based data.	**CO5**
8	Create View and index for database tables with a large number of records.	**CO5**
9	Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries. A country can have many Tourist places. Each Tourist place is identified by using tourist_place_id,	**CO5**

	having a name, belongs to a state, Number of kilometres away from the capital city of that state, history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple emailids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates. Queries: 1. List the state name which is having maximum number of tourist places. 2. List details of Tourist place where maximum number of tourists visited. 3. List the details of tourists visited all tourist places of the state "KARNATAKA". 4. Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places. 5. Display the details of the tourist place visited by the tourists of all country.	
10	Consider the following schema: SUPPLIERS (Sid: integer, sname: string, address: string) PARTS (PID: integer, pname: string,color: string) CATALOG (Sid: integer, PID: integer, cost: real) Design a database to satisfy the above requirements and answer the following queries: a. Find the names of parts for which there is some supplier. b. Find the names of suppliers who supply every part. c. Find the id's of suppliers who supply only red parts.	**CO5**

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, Pearson ,7th Edition, 2017.
2	Database management systems, Ramakrishnan, and Gehrke, Tata McGraw Hill,3rd Edition, 2014.
Reference Books	
1	Data base System Concepts, Silberschatz, Korth and Sudharshan, Tata McGraw Hill, 6th Edition, 2011.
2	An Introduction to Database Systems, C.J. Date, A. Kannan, S. Swaminathan, Pearson education, 8th Edition, 2009.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** and explore the needs and concepts of relational, NoSQL database and Database Security.	Understand	L2
CO2	**Apply** various concepts of databases to obtain relational model and solve SQL queries.	Apply	L3
CO3	**Design** ER diagram & Schema and **Analyse** normal forms for given application.	Analyze	L4
CO4	**Discover** the concepts of transactions, concurrency control along with NOSQL databases.	Evaluate	L5
CO5	**Develop** database applications for the given mini-world problem using relational and NoSQL database.	Create	L6

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	3													
CO3		3	3	2											
CO4		3	3												
CO5			3		3			3	3	3	3	3	3	3	

List of AI Tools to be Used (Not limited to)
ChartDB,SQLAI : tool for ER diagram, SQL queries

Weblinks and Video Lectures (e-Resources)	
1	https://www.coursera.org/courses?query=database%20management
	https://onlinecourses.swayam2.ac.in/cec19_cs05/preview
3	https://nptel.ac.in/courses/106105175
4	http://www.w3schools.com/sql/
5	http://m5zn.com/newuploads/2015/04/27/pdf/
6	https://erdplus.com/

7	https://www.geeksforgeeks.org/dbms/
8	https://zodml.org/sites/default/files/%20An_Introduction_to_Relational_Database_%20Theory_0.pdf
9	https://www.youtube.com/watch?v=4YilEjkNPrQ
10	https://www.youtube.com/watch?v=EGEwkad_IlA
11	https://www.youtube.com/watch?v=t5hsV9lC1rU
12	https://www.youtube.com/watch?v=4YilEjkNPrQ
13	https://www.youtube.com/watch?v=9TwMRs3qTcU
14	https://www.youtube.com/watch?v=3EJlovevfcA

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	5	-	-	-	-
Understand	5	5	10	-	10
Apply	20	25	20	-	10
Analyse	10	10	20	15	10
Evaluate	10	10		15	10
Create	-	-	-	20	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	5	5	-	3	-	2	15	15%
CO2	5	5	5	10	10	10	45	45%
CO3	2	3	2	3	5	5	20	20%
CO4	-	5	3	2	5	5	20	20%

CO5	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total							**100%**	**100%**

SEE- Semester End Examination (50 Marks)

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

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**	**2**	**-**	**-**	**5**	**5**	**10**	**10%**
CO2	**5**	**5**	**5**	**10**	**10**	**5**	**40**	**40%**
CO3	**-**	**5**	**3**	**-**	**5**	**-**	**10**	**10%**
CO4	**-**	**4**	**6**	**5**	**5**	**-**	**20**	**20%**
CO5	**2**	**-**	**2**	**2**	**2**	**2**	**10**	**10%**
Total	**12**	**16**	**16**	**17**	**27**	**12**	**100**	**10%**

COs Mapped to POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1, PO2	-
CO3	PO2, PO3, PO4	-
CO4	PO2, PO3	-
CO5	PO3, PO5, PO8, PO9, PO10, PO11, PO12	PSO1, PSO2

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**	

1. **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.

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:

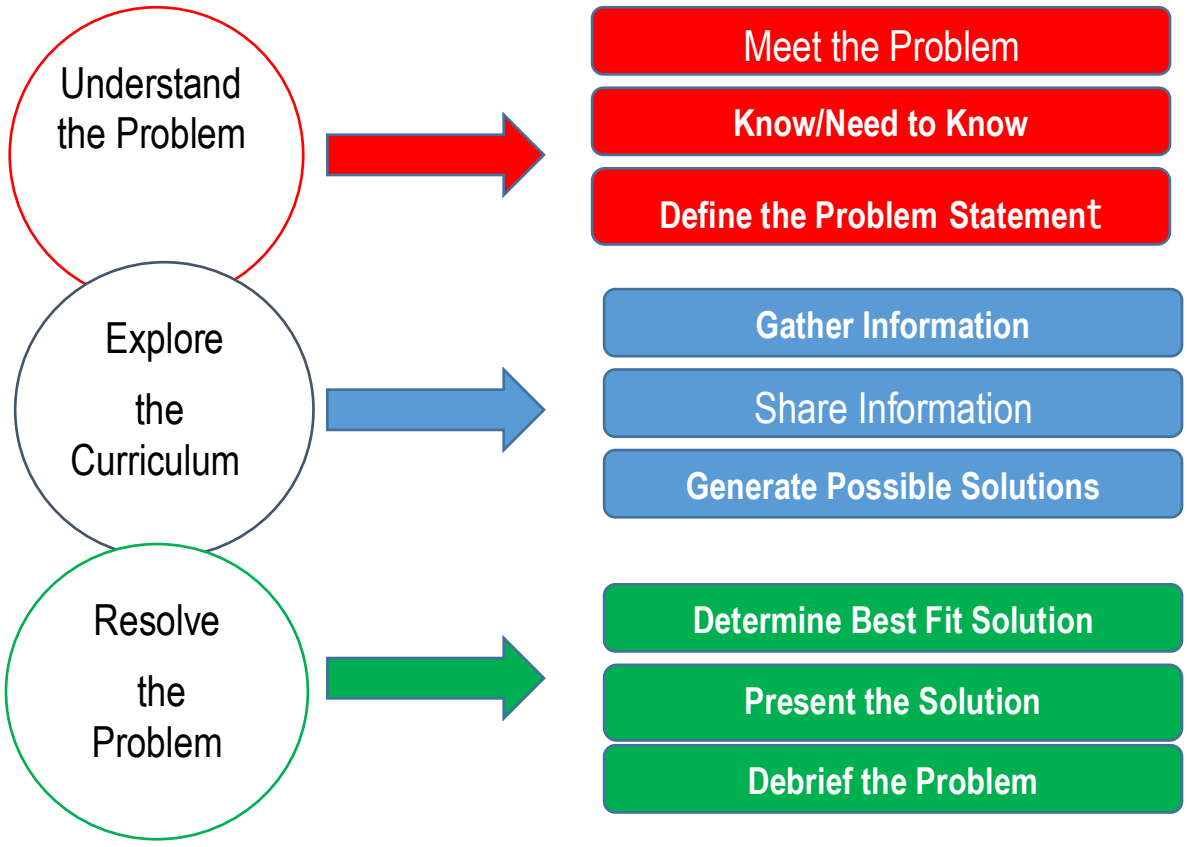
1. Phase 2 is for 11 Weeks

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.

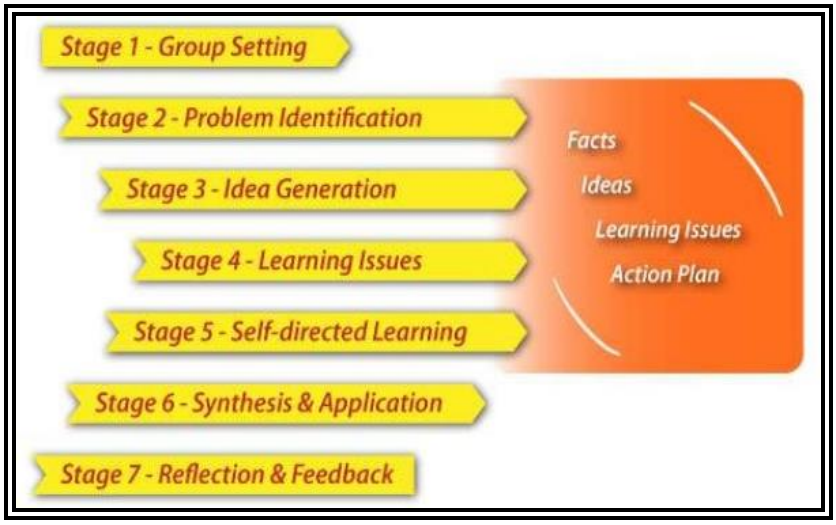
10. Obstacles/Gaps

- Lack of student 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	**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 ▪ Has some factual	▪ 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 in the project	▪ 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	IV
Subject Identified for PBL	Full Stack Development
Prerequisite	HTML, CSS, Database Management System and Python Programming
Justification for the selected subject	1. Develop comprehensive skillset by learning frontend and backend development. 2. Prepare students for roles as fullstack developer, backend specialist or Django expert. 3. Provides a strong foundation for more advanced topics such as cloud computing, DevOps, and machine learning.
List of possible projects	1. Weather Dashboard 2. IoT Device Management Dashboard 3. Augmented Reality (AR) Web Application 4. E-learning System with Adaptive Learning features 5. Cryptocurrency Exchange Platform 6. Realtime Collaboration Tools like To-Do list 7. Fitness Tracker with Activity Analysis 8. Event Calendar 9. Social Media Analytics Tool 10. Voice Controlled Web Application 11. Cyber security Threat Detection Response System 12. Predictive Maintainance Platform for Industrial IoT …… **NOT LIMITED TO**

Signature of the Guide **Signature of HOD**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**				
Course Title	:	**Full Stack Development**				
Course Code	:	**BIS406**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PBL**				
Stream	:	**ISE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:0:2**		**SEE**	:	**50**
Total Hours	:	**30 Hours**		**SEE Duration**	:	**2 Hours**
Credits	:	**02**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand Full Stack Web development concepts.
2	Apply the Django framework concepts to design the responsive web pages.
3	Demonstrate the use of state management and admin interfaces automation in Django.
4	Design and implement Django applications containing dynamic pages with SQL databases.

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	**Django Basics and MVC Pattern Understanding web frameworks:** Overview of Django evolution and MVC pattern Views in Django, Function-based views and class-based views, Mapping URLs to views, URLConfs in Django, Error handling and wildcard patterns in URLs.	5
Pedagogy	**Quiz**	
2	**Django Templates, Models and Admin Interfaces:** Django Templates, Template system basics, Using Django template system effectively, Template tags, filters and template inheritance Configuring databases in Django, defining models, basic data access (CRUD operations), Schema evolution and migrations Activating and using Django admin interfaces, Customizing admin interfaces, Form processing and model forms.	5
Pedagogy	**Quiz, Model Design**	
3	**Advanced Django Concepts and Integration:** Generic Views and State Persistence, Using generic views for CRUD operations, MIME types and generating non-HTML content, Syndication feed framework and sitemap framework, Introduction to AJAX in Django, Using jQuery for AJAX requests, Practical integration examples like autocomplete.	5
Pedagogy	**Demonstration**	
	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 under-stand 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 Definitive Guide to Django: Web Development Done Right, Adrian Holovaty, Jacob Kaplan Moss, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers, Second Esdition, 2009.
2	Django Java Script Integration: AJAX and jQuery, Jonathan Hayward , Pack Publishing, First Edition, 2011
Reference Books	
1	Aidas Bendroraitis, Jake Kronika, Django 3 Web Development Cookbook, Packt Publishing, Fourth Edition, 2020
2	Antonio Mele, Django3 by Example, Pack Publishers, 3rd Edition, 2020

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 operation of full-stack web development using the Model-View-Template (MVT) architecture with Django.	**Understand**	**L2**
CO2	**Apply** Django framework libraries to design and build models, forms and webpages and render non-HTML contents such as CSV and PDF files.	**Apply**	**L3**
CO3	**Analyze** the significance of Template Inheritance and Generic Views in crafting full-stack web applications.	**Analyze**	**L4**
CO4	**Implement** jQuery-based AJAX integration into Django applications to construct responsive full-stack web applications.	**Evaluate**	**L5**

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**												**3**		
CO3		**3**													
CO4					**3**			**3**	**3**	**3**	**3**	**3**		**3**	

COs Mapped to POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO1	PSO1
CO3	PO2	-
CO4	PO5, PO8,PO9,PO10,PO11,PO12	PSO2

List of AI Tools to be Used (Not limited to)
GitHub Copilot : GitHub Copilot acts as an AI pair programmer for full-stack development by generating boilerplate, writing frontend (React) and backend (Node/Python) cod e

Weblinks and Video Lectures (e-Resources)	
1	https://freevideolectures.com/course/3700/django-tutorials
2	https://www.youtube.com/watch?v=2BqoLiMT3Ao
3	https://freevideolectures.com/course/3700/django-tutorials
4	https://freevideolectures.com/course/3700/django-tutorials
5	https://freevideolectures.com/course/3700/django-tutorials

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 Information Science and Engineering

Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CV)

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**

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(CSE, ISE, ECE, EEE, MECH, CV)

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)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

ABILITY ENHANCEMENT COURSE

EXPERIENTIAL LEARNING

1. (a) Define Objectives

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Learning Goal (LG)-1	**Understand** advanced data structures and algorithms needed for competitive programming.
Learning Goal (LG) -2	**Apply** advanced data structures and dynamic programming techniques to design efficient algorithms to solve complex problems.
Learning Goal (LG) -3	**Analyze** different algorithms to efficiently determine the most appropriate for solving a given problem.
Learning Goal (LG)-4	**Evaluate** the performance of the designed solution and optimize the code for better performance and lower complexity.
Learning Goal (LG)-5	**Design** compact and efficient solutions to problems in a time-efficient manner.

(b) Course Outcomes

Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning.	
Course Outcomes (CO)-1	**Understand** and explain advanced programming concepts and algorithms necessary for competitive programming.
Course Outcomes (CO)-2	**Apply** a variety of algorithms including sorting, searching, dynamic programming, greedy algorithms, and divide-and-conquer strategies to solve specific problems.
Course Outcomes (CO)-3	**Analyze** complex problems, break them into manageable components, and devise effective solutions.
Course Outcomes (CO)-4	**Evaluate** the performance of the solution and make necessary optimizations to improve efficiency.
Course Outcomes (CO)-5	**Develop** efficient solutions to given problems using different approaches and achieving desirable results.

(c) Alignment

Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program.						
Sl.No	**Learning Goals**	**Course Outcomes**	**Assessment**	**In-Class Activity**	**Out-of-Class Activity**	**Weightage**
1.	LO-1	CO1	Exam(CIE, SEE)	Debugging Activity	MOOC Course	10
2.	LO-2	CO2	Exam(CIE, SEE)	Think-Pair and Share	Coding Exercises	20
3.	LO-3	CO3	Exam(CIE, SEE)	Problem-Solving	Coding Exercises	25
4.	LO-4	CO4	Exam(CIE, SEE)	Problem-Solving	Online Competitions	20
5.	LO-5	CO5	Project Reviews	Problem-Solving	Projects	25

2. Curriculum Design

(a) Course integration

Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops.

Sl. No.	**Course Name**	**Course Code**	**Justification for selecting the Course for Experiential Learning**
1	**Competitive Programming**	**BIS407**	Competitive Programming helps students achieve proficiency in Programming Languages and gain In-Depth Understanding of Data Structures and algorithms. Students can quickly identify and apply suitable algorithms and data structures for different types of problems, and optimize code for both time and space complexity to meet competitive programming constraints. Students will be well-prepared to participate in competitive programming contests and tackle various algorithmic challenges

			effectively. It improves mathematical, and analytical skills, error debugging and Soft Skills.

(b) Develop Modules

Develop Modules: Create specific modules within these courses that focus on hands-on experiences.

Module No	Lecture No.	Session Topics	RBT Levels	Activities Planned	Course Outcome Mapping	Mode of Delivery	Planned Date	Actual Date
1		**Searching and Sorting:** Counting Sort, Radix Sort, Shell Sort, Bucket sort **Advanced Data Structures:** Single and double ended Priority Queues, Leftist Trees, Optimal Binary Search Trees, B-Trees, B + trees, n-ary trees, Segment Trees, Fenwick Trees (Binary Indexed Trees), Tries, Disjoint Set Union (Union-Find), Sparse Tables **Graph Algorithms:** Strongly Connected Components	L2, L3, L5	Coding activity using appropriate techniques and algorithms to solve coding problems on geeksforgeeks and hackerrank platform https://www.geeksforgeeks.org/top-50-searching-coding-problems-for-interviews/?ref=ml_lbp https://www.geeksforgeeks.org/top-50-string-coding-problems-for-interviews/?ref=ml_lbp https://www.geeksforgeeks.org/top-50-graph-coding-problems-for-interviews/?ref=ml_lbp	CO1, CO2, CO4	Chalk and Talk, PPTs, Case-studies, Hands-on coding exercises		

2		**Dynamic Programming:** Longest Common Subsequence (LCS), Longest Increasing Subsequence (LIS), Matrix Chain Multiplication, Coin Change Problem **String Algorithms:** String Matching (Knuth-Morris-Pratt (KMP), Rabin-Karp, Z Algorithm), Aho-Corasick Algorithm for Pattern Searching, Boyer-Moore	**L3, L4, L6**	https://www.geeksforgeeks.org/top-50-dynamic-programming-coding-problems-for-interviews/ https://www.geeksforgeeks.org/top-50-string-coding-problems-for-interviews/?ref=ml_lbp	**CO2, CO3, CO5**	**Chalk and Talk, PPTs, Case-studies, Hands-on coding exercises**		

Reference Books/ Materials
1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (CLRS), MIT press, 2022.
2. Algorithms, Robert Sedgewick and Kevin Wayne, Addison-wesley professional, 2011.
3. Competitive Programming 3: The New Lower Bound of Programming Contests., Steven, Halim, and Halim Felix. (2013).
4. Guide to competitive programming, Laaksonen, Antti. Cham: Springer, 2020.

MOOC Courses
1. https://www.coursera.org/learn/algorithms-greedy
2. https://www.coursera.org/specializations/algorithms
3. https://www.coursera.org/specializations/data-structures-algorithms
4. https://www.udemy.com/courses/search/?src=ukw&q=The+Bible+of+Competitive+Programming+%26+Coding+Interviews
5. https://www.udemy.com/course/the-bible-of-competititve-programming-part-2/?couponCode=IND21PM
6. https://online.codingblocks.com/courses/competitive-programming-course-online
7. https://www.geeksforgeeks.org/courses/competitive-programming-cp

List of AI tools used (Not Limited to)
GitHub Copilot, perplexity.ai : GitHub Copilot: AI-powered tool that generates OOPS Concept and DSA code, simplifies repetitive tasks, and speeds up programming.

Top 15 websites for Coding Challenges and Competitions
1. GeeksForGeeks 2. The ACM-ICPC International Collegiate Programming Competitions 3. Google Kick Start 4. Google Code Jam 5. Google Hash Code 6. The ICFP Programming Competitions 7. Facebook Hacker Cup 8. Microsoft Imagine Cup 9. Codeforces Coding Competitions 10. Codechef Coding Competitions 11. Topcoder Coding Competitions 12. Atcoder Coding Competitions 13. HackerEarth 14. HackerRank 15. Leetcode

3. Mapping of Learning objectives with Learning Outcomes

Course/Modules	Learning Objective	Learning Outcome	Assessment Method
Module 1:	LO-1, LO-2, LO-4	CO-1, CO-2, CO-4	Problem-solving
Module 2:	LO-2, LO-3, LO-5	CO-2, CO-3, CO-5	Problem-solving

4. Partnerships and Resources

Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits.				
Sl.No	**Name of the Industry Collaboration**	**Projects undertaken / Industrial Visit**	**Domain**	**Project Outcomes**

Implement Experiential Activities

PBL Component	Details
Project Title	Sorting visualizer, Graph traversal simulator, Web Development Projects, Graph-based projects, Dynamic Programming based projects
Real-World Problem	The following projects can be considered as real-world problems. [**Not Limited to**] Real-Time Contest Simulator with Automated Judging Algorithm Visualizer: Interactive Tool for Understanding Algorithmic Concepts Pathfinding Visualizer Route Optimization for Delivery Services Graph Database for Recommendations Game Level Generation Graph-based Search Engine Knapsack Problem Solver Matrix Chain Multiplication Optimizer

	Sequence Alignment Tool
Learning Objectives	**Subject Areas:** Data Structures, Dynamic Programming, Graphs, **Skills Developed:** Programming languages like Java, C++, Python
Timeline	**Start Date:** First day of the semester **Milestones/Checkpoints:** 1. Understand the SDLC process of the project: 1-3weeks 2. Design and Implement the project: 4-8 weeks 3. Evaluate the working of the project: 9-10 weeks 4. Demonstrate and report submission: 11-12 weeks **End Date:** Last day of the semester
Resources Needed	**Materials:** [List materials] **Technology:** [List technology] **Guest Speakers/Experts:** [List experts]
Team Formation	**Group Size:** 4members **Team Roles:** Analysis, Design, Develop and Test
Background Information	Basic programming skills, basic Data Structures and algorithms, Strings
Research Methods	**Primary Sources:** [List methods such as interviews, surveys] **Secondary Sources:** [List methods such as articles, books, videos]

Team Meetings	**Frequency:** Once in a Month **Structure:** Based on their SDLC stage the review for the progress and suggestions given
Collaboration Tools	**Digital Platforms:** Google, Competitive Platforms. **Communication Methods:** In-Person meetings, presentations, demonstrations.
Project Deliverables	Reports, Presentations, Prototypes, Project
Presentation Format	**Options:** PowerPoint, Team Demonstration **Audience:** classmates **Schedule:** Presentation schedule: 11th week
Project Exhibition	Defining the Purpose and Theme Setting Goals Form an Organizing Committee: Invite Participants Choose a Venue Set a Budget for the exhibition Create a Timeline to host

Experiential Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding Experiential Learning 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 Information Science and Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

Date		
EL 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 HOD**

Assessment

Rubrics for Project-Based Learning Assessment

Sl. No	Name of the Student	USN	Criteria	Exemplary (4)	Proficient (3)	Developing (2)	Beginning (1)	Total
			Project Understanding	Demonstrates deep understanding of project goals and requirements; identifies key issues and objectives.	Shows good understanding of project goals and requirements; recognizes most key issues and objectives.	Displays basic understanding of project goals and requirements; some key issues and objectives are unclear.	Lacks clear understanding of project goals and requirements; key issues and objectives are misunderstood.	
			Technical Competence	Mastery of technical skills required for the project; applies skills effectively and efficiently.	Good technical skills; applies skills competently with few errors.	Basic technical skills; occasionally makes errors in application.	Limited technical skills; frequently makes errors in application.	
				Highly creative and original ideas;	Somewhat creative and original ideas;	Limited creativity and originality; shows	Lacks creativity and originality; no	

			Innovation	shows significant innovation and out-of-the-box thinking.	demonstrates innovation in some aspects.	minimal innovation.	evidence of innovative thinking.	
			Problem Solving	Identifies problems accurately and develops effective, comprehensive solutions.	Identifies problems correctly and develops good solutions.	Identifies problems but solutions are somewhat effective or incomplete.	Struggles to identify problems and develop effective solutions.	
			Project Management	Manages project timelines, resources, and tasks exceptionally well; meets all deadlines.	Manages project timelines, resources, and tasks effectively; meets most deadlines.	Manages project timelines, resources, and tasks with some difficulty; misses some deadlines.	Poor management of project timelines, resources, and tasks; frequently misses deadlines.	
			Documentation	Thorough, clear, and well-organized documentation; all necessary details included.	Clear and organized documentation; most necessary details included.	Basic documentation; some necessary details are missing or unclear.	Poor documentation; lacks necessary details and organization.	
				Engaging and	Good presentation;	Basic presentation;	Ineffective	

			Presentation Skills	well-organized presentation; communicates ideas clearly and effectively.	communicates ideas clearly but lacks some engagement or organization.	some ideas are unclear or poorly organized.	presentation; ideas are unclear and poorly organized.	
			Collaboration	Works exceptionally well with team members; shows strong teamwork and leadership skills.	Works well with team members; demonstrates good teamwork.	Works with team members but has some difficulties in collaboration.	Struggles to work with team members; lacks teamwork and collaboration skills.	
			Faculty Assessment	Meets or exceeds faculty expectations in all areas; shows exceptional performance.	Meets faculty expectations in most areas; shows good performance.	Meets some faculty expectations; shows average performance.	Does not meet faculty expectations; shows poor performance.	
			Reflection	Provides deep insights and critical analysis of	Provides good insights and analysis of own work; demonstrates	Provides basic insights and analysis of own work; shows some	Provides minimal or no insights and analysis of own	

				own work; demonstrates significant learning and growth.	learning and growth.	learning and growth.	work; shows little to no learning and growth.	
			Overall Assessment	Exceptional overall performance; exceeds expectations in most or all areas.	Good overall performance; meets expectations in most areas.	Average overall performance; meets expectations in some areas.	Poor overall performance; does not meet expectations in most areas.	

Skills Assessment

Course : Competitive Programming

Student Name	USN	Skill Acquired	Skill Level Before (1-10)	Skill Level After (1-10)	Improvement (After-Before)	Syntax (1-10) Before	Syntax (1-10) After	Logic & Problem Solving (1-10) Before	Logic & Problem Solving (1-10) After	Data Structures (1-10) Before	Data Structures (1-10) After	Libraries & Frameworks (1-10) Before	Libraries & Frameworks (1-10) After	Code Optimization (1-10) Before	Code Optimization (1-10) After	Debugging (1-10) Before	Debugging (1-10) After

UNIVERSAL HUMAN VALUES (UHV)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**			
Course Title	:	**Universal Human Values (UHV)**			
Course Code	:	**BUHK408**			
Course Type (Theory/ Practical/ Integrated)	:	**Theory**			
Category	:	**UHV**			
Stream	:	**Information Science and Engineering**	**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**1:0:0:0**	**SEE**	:	**50**
Total Hours	:	**15 Hours**	**SEE Duration**	:	**1 Hour**
Credits	:	**01**			

Course Learning Objectives: Students will be able to:

Sl.No.	Course Objectives
1	Understand the need for developing a holistic perspective of life.
2	Analyze the scope of life – individual, family, society and nature/existence.
3	Develop more confidence and commitment to understand, learn and act accordingly.
4	Promote sustainability, resource efficiency, and environmental protection while maintaining economic growth and human well-being.

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teacher can use to accelerate the attainment of the various course outcomes.

1. The methodology of this course is exploration and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 30 lectures (discussions)
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

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 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	Think Pair and Share	
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	Poster presentation	
3	**Harmony in 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	Presentation	
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	Case study	
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

You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.

This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution. Encourage the students for group work to improve their creative and analytical skills.

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, Excel Books, 2nd Revised Edition, New Delhi, 2019.
2.	The Teacher"s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G ,3rd revised edition ,2023
Reference Books	
1	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
2	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.

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 significance of value inputs in a classroom and start applying them in their life and profession	**Understand**	**L2**
CO2	**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.	**Apply**	**L3**
CO3	**Analyze** between values and skills, happiness and accumulation of Physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	**Analyze**	**L4**
CO4	**Evaluate** the impact of human behavior on environmental sustainability	**Evaluate**	**L5**
CO5	**Create** a personal and professional development plan by integrating human values, ethics, and environmental responsibility	**Create**	**L6**

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			3					
CO5						3	3	3		3			3		

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/109104068
2	https://www.youtube.com/watch?v=FbC9ZhaVc3Y

3	https://www.youtube.com/watch?v=N6foRtAwVyU&list=PLWDeKF97v9SMKcx1CKpONmPxLZYgjKVG8
4	https://www.youtube.com/watch?v=0tdgOzp5VWs&list=PLWDeKF97v9SMKcx1CKpONmPxLZYgjKVG8&index=3
5	https://www.youtube.com/watch?v=XS-eXqppf_w&t=4s
6.	https://archive.nptel.ac.in/courses/103/107/103107157/
7.	https://www.youtube.com/watch?v=uCuLBaNONW0

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	5		10	
Understand	5	5	10	
Apply	20	25	25	
Analyse	10	10	5	20
Evaluate	10	10		20
Create				10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1(50)			Test-2(50)				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					15	15%
CO2	5	10	5	10	10	5	45	45%
CO3	5	5			5	5	20	20%
CO4		5	5	5	5		20	20%
CO5						5		
Total							100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5%

Understand	**15%**
Apply	**40%**
Analyse	**20%**
Evaluate	**10%**
Create	**10%**

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module- 3	Module-4	Module-5		
CO1	5	5		5	5	10	10%
CO2	5	10	10	10	5	40	10%
CO3		5		5		10	40%
CO4		10	5	5		20	10%
CO5	2	2	2	2	2	10	20%
Total	12	32	17	27	12	100	10%

COs Mapped to POs and PSOs:

CO	PO	PSO
CO1	-	-
CO2	PO6	-
CO3	PO6	-
CO4	PO7, PO10	-
CO5	PO6, PO7, PO8, PO10	PSO1