

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus III to IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Computer Science and Design

3rd & 4th Semester B.E

ABOUT THE INSTITUTE

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

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

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

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

VISION OF THE INSTITUTE

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

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society 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 Computer Science and Design Department, established in 2021, is a dynamic and innovative centre of learning and research, dedicated to advancing the frontiers of technology and creative design. Our state-of-the-art facilities and experienced faculty provide students with a robust education in programming, algorithms, data structures, artificial intelligence, and user experience design. We emphasize critical thinking, problem-solving, and hands-on experience, ensuring our graduates are well-equipped for the challenges of the tech and design industries. Through industry partnerships, internships, and collaborative projects, students gain real-world experience and professional growth opportunities. The department is committed to fostering a supportive and inclusive environment, encouraging creativity, and inspiring future leaders in computer science and design.

VISION OF THE DEPARTMENT

“Envisions to become a renowned faculty of engineering globally with a profound impact on the society through continual innovation in education and research in the field of Computer Science & Design”

MISSION OF THE DEPARTMENT

- M1:** To create technology enabled experiential learning environment for students focusing on development of problem solving and design thinking
- M2:** To collaborate with Industries, R & D organizations and Universities to solve socially relevant problems through joint research in the field of Computer Science keeping design as a focus
- M3:** To create a conducive environment for faculty to upskill and reskill themselves
- M4:** To attract talented faculty to the work force and talented students to the program.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

- PEO1:** To create technology enabled experiential learning environment for students focusing on development of problem solving and design thinking
- PEO2:** To collaborate with Industries, R& D organizations and Universities to solve socially relevant problems through joint research in the field of Computer Science keeping design as a focus
- PEO3:** To create a conducive environment for faculty to upskill and reskill themselves
- PEO4:** To attract talented faculty to the work force and talented students to the program.

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: Students will have the knowledge of Computer hardware, system software, algorithms, networking and data bases.

PSO2: Students will be able to design, analyze and develop efficient and secure algorithms using appropriate data structures, databases for processing of data.

PSO3: Students will be capable of developing stand alone, embedded and web-based solutions having easy to operate interface using software engineering practices and contemporary computer programming languages.

PSO4: Students will be able to demonstrate ability to self-learn, write technical articles, project reports and research papers.



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)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSED UG SCHEME

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

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

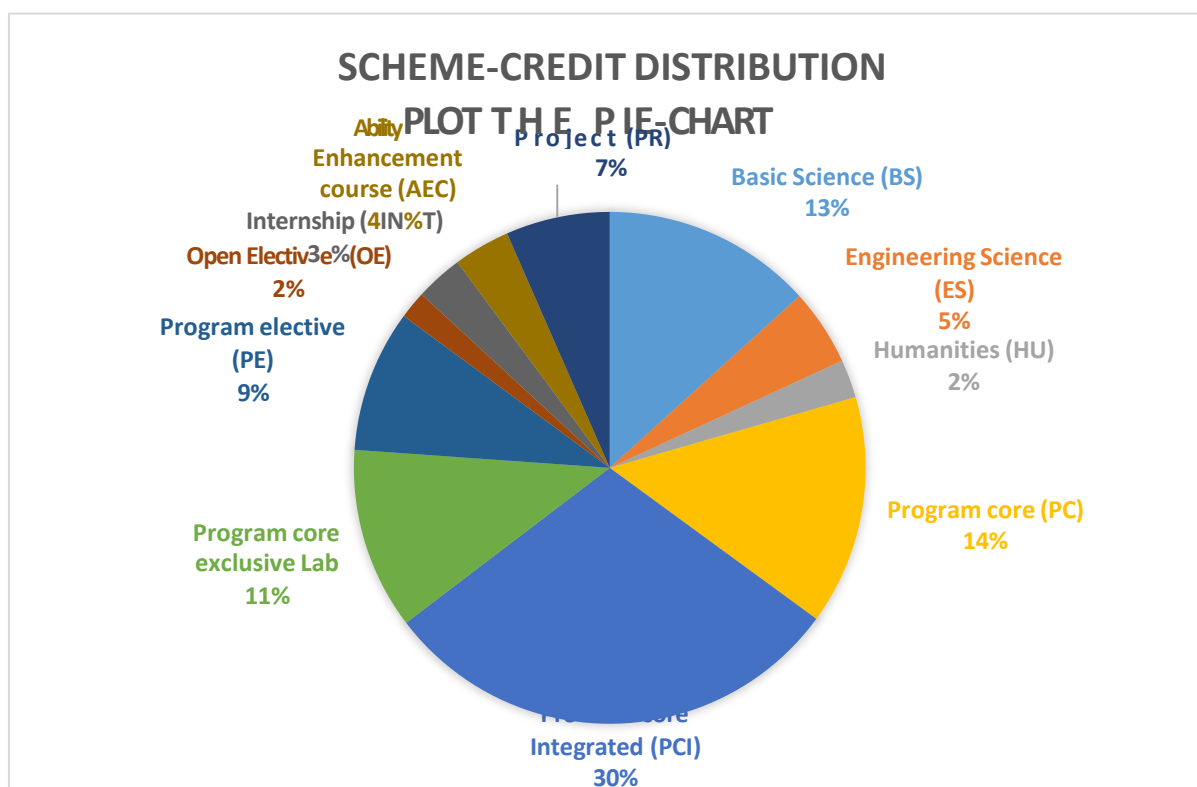
3rd Sem & 4th Sem

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

Scheme Distribution

Department of Computer Science and Design Engineering

Course Component	Credits	% of Credits
Basic Science (BS)	22	13.75
Engineering Science (ES)	09	5
Humanities (HU)	04	2.5
Program core (PC)	24	15
Program core Integrated (PCI)	49	30.62
Program core exclusive Lab	19	11.87
Program elective (PE)	15	9.3
Open Elective (OE)	03	1.8
Internship (INT)	05	3.1
Ability Enhancement course (AEC)	06	3.7
Project (PR)	11	6.8
Total	160	100



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

Course Category	Semester								Total Credits
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
Basic Sciences (BSC)	8	8	3	3					22
Engineering Sciences (ESC)	3	6							9
Humanities, Social Sciences and Management (HSMC)	2	2							4
Ability Enhancement Course (AEC)	1	1	1	1	1	1			6
Universal Human Values (UHV)			1	1	1	1			4
Professional Core Courses (PCC)			6	6	6	3	3		24
Integrated Professional core Course (IPCC)	6	3	8	8	8	8	8		49
Professional Elective Course (PEC)					4	4	4	3	15
Institutional Open Elective Courses (IOE)						3			3
Internship (INT)							5		5
Mini Project / Project Work (PW)			2	2	2	2		11	19
Non-credit Mandatory Courses (NCMC)									
Total Credits	20	20	21	21	22	22	20	14	160



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

3rd SEMESTER: Computer Science & Design (CSD)

Sl · No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total Hrs/w eek		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BMATC301	Linear Algebra, Discrete Mathematics and Graph Theory	BSC	MAT	MAT	2	2	0	0	4	3	3hrs	50	50	100
2	BCG302	Data Structures and Applications	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
3	BCG303	Object Oriented Programming and Design	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
4	BCG304	Digital Design and Computer Organization	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
5	BCG305	Operating System	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
6	BCG306	Web Technology	PBL	CSD	CSD	0	2	0	2	4	2	3hrs	50	50	100
7	BCG307	Game Development Tools	AEC	CSD	CSD	0	0	2	0	2	1	3hrs	50	50	100
8	BSCK308	Social Connect and Responsibility	SCR	CSD	CSD	0	0	2	0	2	1	-	100	-	100
9	BNSK309	National Service Scheme (NSS)	NCMC	CSD	CSD	0	0	2	0	2	-	-	100	-	100
	BPEK309	Physical Education (PE)													
	BYOK309	Yoga													
Total						14	04	10	02	30	21				900

4th SEMESTER: Computer Science & Engineering (CSE)

BAMCET-2021 Computer Science & Engineering (CSE)															
Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credi ts	Examination			
						Lec ture L	Tutoria l T	Practic al P	Project S	Total		SEE Duration (Hrs)	CIE Mark s	SEE Marks	Total Mark s
1	BMATC40 1	Statistics, Probability and Optimization Techniques	BSC	MAT	MAT	3	0	0	0	3	3	3hrs	50	50	100
2	BCG402	Computer Graphics and Visualization	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
3	BCG403	Design and Analysis of Algorithms	IPCC	CSD	CSD	3	0	2	0	5	4	3hrs	50	50	100
4	BCG404	Database Management System	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
5	BCG405	Computer Networks	PCC	CSD	CSD	3	0	0	0	3	3	3hrs	50	50	100
6	BCG406	Database Management System Lab	PBL	CSD	CSD	0	2	0	2	4	2	3hrs	50	50	100
7	BCG407	Design Processes and Perspectives	AEC	CSD	CSD	0	0	2	0	2	1	3hrs	50	50	100
8	BUHK408	Universal Human Values (UHV)	UHV	Any Dep artm ent	Any Departmen t	0	0	2	0	2	1	3hrs	50	50	100
9	BNSK459	National Service Scheme (NSS)	NCMC		NSS coordinator	0	0	2	0	0	0	---	100	--	100
	BPEK459	Physical Education (PE) (Sports and Athletics)			Physical Education Director										
	BYOK459	Yoga			Yoga Teacher										
Total						15	02	10	02	27	21				900

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

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

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

Newly introduced subjects in the syllabus

		3rd Semester	4th Semester
1.	List of Existing Elective Courses		
2.	List of New Existing Elective Courses	1.Game Development Tools	1.Human Computer Interface 2. Design Process and Perspectives
3.	List of New Industry Aligned Courses	1.Game Development Tools	1.Human Computer Interface 2. Design Process and Perspectives

Percentage of Change in the Syllabus

3 rd Semester						
Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1	BMATC301	Mathematics for Computer Science (Discrete mathematics and Graph Theory)				
2	BCG302	Data Structures and Applications	Lab is introduced based on the concept	Dynamic Memory Allocation, Pointers examples.	30%	
3	BCG303	Object Oriented Programming and Design	Design Patterns are added	Autoboxing,TypeWrappers and Enumerations examples	20%	
4	BCG304	Digital Design and Computer Organization	Teaching Learning Process is Changed to Theory	-	20%	
5	BCG305	Operating System	Teaching Learning Process is Changed to Theory	-	20%	
6	BCG306	Web Technology	All topics are new & PBL	Lab Programs	50%	
7	BCG307	Game Development Tools	Hands on Lab			New subject introduced with industry alignment
8	BSCK308	Social Connect and Responsibility				
4 th Semester						
Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1	BMATC401	Mathematical and Statistical Foundations				
2	BCG402	Computer Graphics and Visualization	No change	-		
3	BCG403	Design and Analysis of Algorithms	Navigation algorithms concept added	Lab programs	20%	
4	BCG404	Database Management System	Practical Component is changed to PBL, Teaching Learning Process is Theory	-	20%	
5	BCG405	Computer Networks	All topics are new			New subject introduced with industry alignment

6	BCG406	Database Management System Lab	PBL	Lab Programs	50%	
7	BCG407	Design Processes and Perspectives	Hands on Lab			New subject introduced with industry alignment
8	BUHK408	Universal Human Values				

3rd SEMESTER

**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).



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd			
Course Title	:	Linear Algebra, Discrete mathematics and Graph theory			
Course Code	:	BMATC301			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	CSD		CIE	: 50 Marks
Teaching hour/week (L:T:P:S)	:	2:2:0:0		SEE	: 50 Marks
Total Hours	:	40 Hrs		SEE Duration	: 3 Hours
Credits:	:	3			

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, discrete mathematics and graph theory in solving problems
3	Analyze problems using concepts of linear algebra, discrete mathematics and graph theory
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 devise innovative pedagogy to improve teaching-learning.



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	Linear Algebra-I 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	Linear Algebra-II 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	Sets and Relations Sets, operations on sets, cardinality of sets, inclusion-exclusion principle, pigeonhole principle, relations and their properties, representation of relations, composition of relations, equivalence relations, partial orderings, Functions: one-one and onto, composition of functions, inverse functions.	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	Graph Theory Introduction- basic definitions, isomorphism, sub-graphs, Eulerian and Hamiltonian graphs, Hamiltonian paths and circuits, trees, BFS & DFS Algorithms, sorting, weighted trees and prefix codes	8
Pedagogy	Chalk and board, group discussion, ppt, videos	

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

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, 6 th Edition, 2021.
2	Theory and problems of linear algebra, Seymour Lipschutz, Marc Lipso, Schaum's outline series, McGraw-Hill Education, 6 th edition, 2017.
3	Discrete Mathematics and its Applications, Kenneth H Rosen, McGraw Hill publications, 7th edition.
4	Graph Theory with applications to engineering and computer science, Narsingh Deo, Dover Publications, 1 st Edition, 2016.

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Erwin Kreyzig, "Advanced Engineering Mathematics", 10 th Edition, Wiley Publications, 2018.
2	B. S. Grewal "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021
3	Graph Theory, Schaum series outline, V K Balakrishnan, Mc Graw Hill, 1 st 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 linear algebra, discrete mathematics and graph theory	Remember, Understand	L1, L2
CO2	Apply techniques of linear algebra, discrete mathematics and graph theory to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using linear algebra, discrete mathematics and graph theory	Analyse	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
5	https://archive.nptel.ac.in/courses/111/106/111106050/

Assessment Pattern (both CIE and SEE)

Applied 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	
	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	CCA-1- Pedagogical Initiatives		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

CIE	Assessment (CCA)	CCA-2- Pedagogical Initiatives	Considering all the Modules	50				Based Learning, then one assessment method may be adopted
	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 two tests is taken and scaled down to **25 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 **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** 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 **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 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)	

	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	

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%
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Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Introduction, Elementary transformations on a matrix	1
1	Echelon form of a Matrix	1
1	Rank of a matrix	1
1	Consistency of system of linear equations	1
1	Gauss elimination	1
1	Gauss – Seidel method to solve system of linear equations	1
1	Eigen values and eigen vectors of a matrix	1
1	Rayleigh power method to determine the dominant eigen value of a matrix	1
1	Diagonalization of matrices and Problems	1
2	Introduction to vector spaces	1
2	Subspaces	1
2	Linear combination	1
2	Linear span	1
2	Linear Dependence and Independence and Problems	1
2	Basis and Dimension	1
2	Linear Mappings	1
2	Rank-Nullity Theorem and Problems	1
3	Sets, Operations on sets, Cardinality of sets	1
3	Inclusion-exclusion principle, pigeonhole Principle	1
3	Relations and Their Properties and Representation of Relations	1
3	Composition of Relations	1
3	Equivalence Relations	1
3	Partial Orderings	1

3	Functions-One-One and Onto	1
3	Composition of functions and Inverse functions	1
4	Introduction to Logics.	1
4	Basic connectives and truth tables.	1
4	Logical equivalence-laws of logic.	1
4	Predicates,	1
4	Quantifiers.	1
4	Logical equivalence involving Quantifiers.	1
4	logical implication-rules of inference	1
	Proofs of theorems.	1
5	Introduction- Basic definitions.	1
5	Isomorphism, sub-graphs	1
5	Eulerian and Hamiltonian graphs	1
5	Euler graphs	1
5	Hamiltonian paths and circuits	1
5	Trees	1
5	BFS & DFS Algorithms	1
5	Sorting, weighted trees and prefix codes	1
Total		40 Hrs

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

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

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	:	3rd			
Course Title	:	Data Structures and Applications			
Course Code	:	BCG302			
Course Type (Theory/Practical/Project/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40 hours Theory + 20 Hours of Practical Classes		SEE Duration	: 3Hours
Credits	:	4			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To explain fundamentals of data structures and their applications.
2	To illustrate representation of Different data structures such as Stack, Queues, Linked Lists, Trees and Graph
3	To Design and Develop Solutions to problems using Linear Data Structures.
4	To discuss applications of Nonlinear Data Structures in problem solving.
5	To introduce advanced Data structure concepts such as Hashing and Optimal Binary Search Trees

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 DATA STRUCTURES: Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations Review of pointers and dynamic Memory Allocation, ARRAYS and STRUCTURES: Arrays, Dynamic Allocated Arrays, Structures and Unions, Polynomials, Sparse Matrices, representation of Multidimensional Arrays, Strings STACKS: Stacks, Stacks Using Dynamic Arrays, Evaluation and conversion of Expressions Text Book: Chapter-1:1.2 Chapter-2: 2.1 to 2.7 Chapter-3: 3.1,3.2,3.6 Reference Book 1: 1.1 to 1.4	8
Pedagogy	Utilize Visualization Tools to illustrate the operations and structures of various data structures for better comprehension.	
2	QUEUES: Queues, Circular Queues, Using Dynamic Arrays, Multiple Stacks and queues. LINKED LISTS: Singly Linked, Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Polynomials Text Book: Chapter-3: 3.3, 3.4, 3.7 Chapter-4: 4.1 to 4.4	8
Pedagogy	Incorporate Problem-Based Learning to apply data structures concepts in real-world scenarios, fostering practical skills.	
3	LINKED LISTS: Additional List Operations, Sparse Matrices, Doubly Linked List. TREES: Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees. Text Book: Chapter-4: 4.5,4.7,4.8 Chapter-5: 5.1 to 5.3, 5.5	8
Pedagogy	Implement Interactive Coding Sessions to deepen understanding and application of data structures concepts.	
4	TREES(Cont.): Binary Search trees, Selection Trees, Forests, Representation of Disjoint sets, Counting Binary Trees, GRAPHS: The Graph Abstract Data Types, Elementary Graph Operations Text Book: Chapter-5: 5.7 to 5.11 Chapter-6: 6.1, 6.2	8
Pedagogy	Adopt a Flipped Classroom Approach to encourage independent study of data structures concepts, allowing for active engagement during class.	
5	HASHING: Introduction, Static Hashing, Dynamic Hashing PRIORITY QUEUES: Single and double ended Priority Queues, Leftist Trees INTRODUCTION TO EFFICIENT BINARY SEARCH TREES: Optimal Binary Search Trees Text Book: Chapter 8: 8.1 to 8.3 Chapter 9: 9.1, 9.2 Chapter 10: 10.1	8
	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another	

- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	Cos
1	Develop a Program in C for the following: a) Declare a calendar as an array of 7 elements (A dynamically Created array) to represent 7 days of a week. Each Element of the array is a structure having three fields. The first field is the name of the Day (A dynamically allocated String), The second field is the date of the Day (A integer), the third field is the description of the activity for a particular day (A dynamically allocated String). b) Write functions create (), read () and display (); to create the calendar, to read the data from the keyboard and to print weeks activity details report on screen.	CO2,CO3,CO4
2	Develop a Program in C for the following operations on Strings. a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP) b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR Support the program with functions for each of the above operations. Don't use Built-in functions.	CO1,CO3,CO4
3	Develop a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate how Stack can be used to check Palindrome d. Demonstrate Overflow and Underflow situations on Stack e. Display the status of Stack f. Exit Support the program with appropriate functions for each of the above operations	CO2,CO3,CO4
4	Develop a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operand	CO5,CO3,CO4
5	Develop a Program in C for the following Stack Applications a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ b. Solving Tower of Hanoi problem with n disks	CO2,CO3,CO4
6	Develop a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) a. Insert an Element on to Circular QUEUE b. Delete an Element from Circular QUEUE c. Demonstrate Overflow and Underflow situations on Circular QUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations	CO2,CO3,CO4
7	Develop a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Programme, Sem, PhNo	CO1,CO3,CO4

	a. Create a SLL of N Students Data by using front insertion. b. Display the status of SLL and count the number of nodes in it c. Perform Insertion / Deletion at End of SLL d. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) e. Exit	
8	Develop a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo a. Create a DLL of N Employees Data by using end insertion. b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Demonstrate how this DLL can be used as Double Ended Queue. f. Exit	CO2,CO3,CO4
9	Develop a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes a. Represent and Evaluate a Polynomial $P(x,y,z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3$ b. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z) Support the program with appropriate functions for each of the above operations	CO2,CO3,CO4
10	Develop a Program in C for the following operations on Graph(G) of Cities a. Create a Graph of N cities using Adjacency Matrix. b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method	CO2,CO3,CO4
Open ended Programs		
1	Develop a Social Media Feed Algorithm to dynamically update user feeds based on interactions using a graph data structure.	C01,C05
2	Develop a Route Optimization Application that calculates the shortest path between locations on a map using Dijkstra's algorithm.	C01,C05
3	Develop an Inventory Management System that tracks products and quantities in real-time using hash tables for efficient lookup and updates.	C01,C05

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014

Reference Books

1	Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1 st Ed, McGraw Hill, 2014
2	Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2 nd Ed, Cengage Learning,2014.
3	Reema Thareja, Data Structures using C, 3 rd Ed, Oxford press, 2012.
4	Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
5	A M Tenenbaum, Data Structures using C, PHI, 1989

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain different data structures and their applications.	L2	UNDERSTAND
CO2	Apply Arrays, Stacks and Queue data structures to solve the given problems.	L3	APPLY
CO3	Use the concept of linked list in problem solving	L3	APPLY
CO4	Develop solutions using trees and graphs to model the real-world problem.	L3	APPLY
CO5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html
2	https://nptel.ac.in/courses/106/105/106105171
3	http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
4	https://www.youtube.com/watch?v=3Xo6P_V-qns&t=201s

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	5	-	-	-
Understand	20	20	10	10	-
Apply	20	20	20	20	25
Analyse	5	2	20	20	25
Evaluate					
Create					

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution		Weightage
------	--------------------	--	-----------

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

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.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3rd			
Course Title	:	Object Oriented Programming and Design			
Course Code	:	BCG303			
Course Type (Theory/ Practical/ Project/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40 hours Theory + 20 Hours of Practical Classes		SEE Duration	: 3 Hours
Credits	:	4			

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To develop object-oriented programs using inheritance and interfaces.
2	To implement polymorphism to create flexible and reusable code.
3	Capable of applying design patterns in Java to enhance software architecture.
4	Utilize advanced Java /Python features for robust application development.
5	Students are able to collaborate on real-world projects, demonstrating effective teamwork and communication skills.

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 Program -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 Object Oriented Programming: Computer programming background- Java overview. Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.Primitive data type vs. Object data type in Java with Examples Textbook1: Chapter 2, 3, 4, 5	8
Pedagogy	Code Review Sessions: Students present their implementations of design patterns in peer review sessions to foster collaborative learning.	
2	Inheritance-Types of Inheritance, Polymorphism Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance, I/O Streams: C++ /Java Class Hierarchy- File Stream-Text File Handling- Binary File Handling during file operations Textbook1: Chapter 6,7	8
Pedagogy	Role-Playing Exercises: Role-playing activities enable students to discuss design decisions from different perspectives, highlighting the importance of collaboration in software design	
3	Exception Handling: Introduction to Exception - Benefits of Exception handling- Major reasons why an exception Occurs, Types of Exceptions- Built-in Exceptions and User-Defined Exceptions Textbook1: Chapter 8,9	8
Pedagogy	Code Review Sessions: Students present their implementations of design patterns in peer review sessions to foster collaborative learning.	
4	Design Patterns: Overview of design patterns and their importance in software development. Discussion of categories: Creational, Structural, and Behavioral patterns. Detailed examination of Model-View-Controller (MVC), Iterator, Singleton, and Adapter patterns. Exploration of use cases and implementation details across various programming languages, including thread safety considerations for the Singleton pattern. Textbook 2: Chapter 1, 2, 3	8
Pedagogy	Pattern Implementation Workshops: Workshops allow students to implement specific design patterns from scratch, exploring their practical use in real-world scenarios.	

5	Introduction to Java Unit Testing framework, focusing on its role in ensuring code quality. Explanation of assert methods available in the framework, including assertEquals, assertTrue, assertFalse, and others. Overview of Object-Oriented Programming (OOP) concepts supported by the Unit Test framework, such as test case classes, inheritance for shared tests, and the use of setup and teardown methods for preparing and cleaning up test environments. Textbook2: Chapter 4, 5	8
Pedagogy	Case Study Analysis: Students analyze case studies of software systems using various design patterns to discuss design choices and their benefits	
	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	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	Develop a stack class to hold a maximum of 10 integers with suitable methods. Develop a JAVA main method to illustrate Stack operations.	CO5
3	A class called Employee, which models an employee with an ID, name and salary, is designed as shown in the following class diagram. The method raiseSalary (percent) increases the salary by the given percentage. Develop the Employee class and suitable main method for demonstration.	CO4
4	Develop a JAVA program to create a class named shape. Create three sub classes namely: circle, triangle and square, each class has two member functions named draw () and erase (). Demonstrate polymorphism concepts by developing suitable methods, defining member data and main program.	CO4
5	Develop a JAVA program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter(). Create subclasses Circle and Triangle that extend the Shape class and implement the respective methods to calculate the area and perimeter of each shape.	CO3
6	Develop a JAVA program to create an interface Resizable with methods resizeWidth(int width) and resizeHeight(int height) that allow an object to be resized. Create a class Rectangle that implements the Resizable interface and implements the resize methods	CO3
7	Write a program to illustrate creation of threads using runnable class. (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds)	CO2
8	Develop a JAVA program to create a package named mypack and import & implement it in a suitable class	CO2
9	Develop a JAVA program to raise a custom exception (user defined exception) for DivisionByZero using try, catch, throw and finally	CO2

10	. Develop a program to create a class MyThread in this class a constructor, call the base class constructor, using super and start the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.	CO1
Note	Open Ended Programs: 1. Develop a Personal Finance Management System using Object-Oriented Programming in Java.	
	2.Create a Library Management System with Object-Oriented Design Principles in Java.	
	3. Build a Simple Game (e.g., Tic-Tac-Toe) that Implements Object-Oriented Concepts in Java.	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Java Programming and Problem Solving" by D. S. Malik
2	Design Patterns: Elements of Reusable Object-Oriented Software by Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides
3	Object Oriented Programming – Learning Python by Mark Lutz, David Ascher.
4	Java: The Complete Reference, Twelfth Edition, by Herbert Schildt, November 2021, McGraw-Hill, ISBN: 9781260463422

Reference Books

1	Object-Oriented Programming in C++" by Robert Lafore
2	Java: How to Program" by Paul Deitel and Harvey Deitel
3	"Head First Object-Oriented Analysis and Design" by Brett McLaughlin, Gary Hancock, and David H. Hurst

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Able to understand and design the solution to a problem using object-oriented programming concepts.	L2	UNDERSTAND
CO2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.	L3	APPLY
CO3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism	L3	APPLY
CO4	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems.	L3	APPLY
CO5	Students are able to effectively use software engineering tools like JUnit/PyUnit, debugger, profilers, and version control.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://www.geeksforgeeks.org/oops-object-oriented-design/
2	https://www.geeksforgeeks.org/primitive-data-type-vs-object-data-type-in-java-with-examples/?ref=lbp
3	https://www.geeksforgeeks.org/unit-testing-python-unittest/
4	https://www.youtube.com/watch?v=xFjslWrRftE&ab_channel=Simplilearn
5	https://www.youtube.com/watch?v=6T_HgnjoYwM&ab_channel=Simplilearn
6	https://www.youtube.com/watch?v=WqT_qGgoZbw&ab_channel=Simplilearn

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
	Practical	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	5	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	----	10	5	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
Viva-voce			10						
Total CIE Practical						25	10	Scale down Marks of Experiments, Record, Observation Practical Test and Open-Ended Experiment	

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	5	-	-	-
Understand	20	20	10	10	-
Apply	20	20	20	20	25
Analyse	5	2	20	20	25
Evaluate					
Create					

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

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).

**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

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	:	3rd			
Course Title	:	Digital Design and Computer Organization			
Course Code	:	BCG304			
Course Type (Theory/Practical/Project/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Hours		SEE	: 03Hours
Credits	:	3		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To evaluate a Boolean expression using Karnaugh maps, outline and analyze basic combinational logic circuit
2	Gain knowledge about other combinational circuits and design sequential circuits using flip flops.
3	Expose students to the basic methods of using various registers and counter
4	Explain the basic sub systems of a computer, their organization, structure, and operation and illustrate the concept of programs as sequences of machine instructions.
5	Demonstrate different ways of communicating with I/O devices and describe memory hierarchy and concept of cache memory.

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)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduction to Digital Design: Binary Logic, Basic Theorems And Properties Of Boolean Algebra, Boolean Functions, Digital Logic Gates, Introduction, The Map Method, Four-Variable Map, Don't-Care Conditions, NAND and NOR Implementation, Other Hardware Description Language - Verilog Model of a simple circuit. Text book 1: 1.9, 2.4, 2.5, 2.8, 3.1, 3.2, 3.3, 3.5, 3.6, 3.9	8
Pedagogy	Chalk and talk/ Think and pair/PowerPoint Presentation/Videos	
2	Combinational Logic: Introduction, Combinational Circuits, Design Procedure, Binary Adder-Subtractor, Decoders, Encoders, Multiplexers. HDL Models of Combinational Circuits - Adder, Multiplexer, Encoder. Sequential Logic: Introduction, Sequential Circuits, Storage Elements: Latches, Flip-Flops. Text book 1: 4.1, 4.2, 4.4, 4.5, 4.9, 4.10, 4.11, 4.12, 5.1, 5.2, 5.3, 5.4.	8
Pedagogy	Chalk and talk/ Case Study/PowerPoint Presentation/Videos	
3	Basic Structure of Computers: Functional Units, Basic Operational Concepts, Bus structure, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instruction and Instruction sequencing, Addressing Modes. Text book 2: 1.2, 1.3, 1.4, 1.6, 2.2, 2.3, 2.4, 2.5	8
Pedagogy	Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
4	Input/output Organization: Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access: Bus Arbitration, Speed, size and Cost of memory systems. Cache Memories - Mapping Functions. Text book 2: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4, 5.4, 5.5.1	8
Pedagogy	Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
5	Basic Processing Unit: Some Fundamental Concepts: Register Transfers, Performing ALU operations, fetching a word from Memory, Storing a word in memory. Execution of a Complete Instruction. Pipelining: Basic concepts, Role of Cache memory, Pipeline Performance. Text book 2: 7.1, 7.2, 8.1	8

	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process
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Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	M. Morris Mano & Michael D. Ciletti, Digital Design With an Introduction to Verilog Design, 5e, Pearson Education.
2	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill.
Reference Books	
1	Donald P Leach, Albert Paul Malvino & Goutam Saha: "Digital Principles and Applications", 7th Edition, Tata McGraw Hill, 2010.
2	A.P.Godse, D.A.Godse: "Logic Design", Technical Publications, 2011
3	William Stallings: "Computer Organization & Architecture", 7th Edition, PHI, 2006.
4	Vincent P. Heuring & Harry F. Jordan: "Computer Systems Design and Architecture", 2nd Edition, Pearson Education, 2004.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply the K-Map techniques to simplify various Boolean expressions.	Apply	L3
CO2	Design different types of combinational and sequential circuits along with Verilog programs.	Apply	L3
CO3	Describe the fundamentals of machine instructions, addressing modes and Processor performance.	Understand	L2
CO4	Explain the approaches involved in achieving communication between processor and I/O	Understand	L2
CO5	Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.	Analyse	L4

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=OI8D69VKX2k
2	https://www.youtube.com/watch?v=GRInNLx3Tug
3	https://www.youtube.com/watch?v=Ez_kyBS-y5w
4	https://www.youtube.com/watch?v=A9WLYbE0p-I
5	https://www.youtube.com/watch?v=lw1STgKUpW0

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			20
Apply	30	20	30	30
Analyse		30	20	
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3rd			
Course Title	:	Operating Systems			
Course Code	:	BCG305			
Course Type (Theory/Practical/Project/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40		SEE	: 3 Hours
Credits	:	03		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To demonstrate the need for OS and different types of OS
2	To discuss suitable techniques for management of different resources
3	To demonstrate different APIs/Commands related to processor, memory, storage and file system management

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem 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, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services: User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot	8 Hours
Pedagogy	Think Pair and Share	
2	Process Management: Process concept, Process scheduling, Operations on processes, Inter process communication. Multi-threaded Programming: Overview, Multithreading models, Thread Libraries, Threading issues. Process Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Thread scheduling, Multiple-processor scheduling	8 Hours
Pedagogy	Problem Solving	
3	Process Synchronization: Synchronization, The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classical problems of synchronization. Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock	8 Hours
Pedagogy	Think Pair and Share	
4	Memory Management: Main Memory: Hardware and control structures, OS support, Address translation, Swapping, Memory Allocation (Partitioning, relocation), Fragmentation, Segmentation, Paging, TLBs context switches Virtual Memory - Demand Paging, Copy-on-	8 Hours

	Write, Page replacement policy - LRU (in comparison with FIFO & Optimal), Thrashing, design alternatives - inverted page tables, bigger pages. Case Study: Linux/Windows Memory.	
Pedagogy	Think Pair and Share	
5	Storage Management: Mass-Storage Structure - Mass-Storage overview, Disk Scheduling, Swap-Space Management, RAID structure. File System Interface - file organization/structure and access methods, directories, sharing. File System Implementation/Internals: File control Block (inode), partitions & mounting, Allocation methods.	8 Hours
	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	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 8th edition, Wiley-India, 2015
Reference Books	
1	Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition.
2	D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3	P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI (EEE), 2014.
4	William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain the structure and functionality of operating system.	L2	Understand
CO2	Apply appropriate CPU scheduling algorithms for the given problem.	L3	Apply
CO3	Analyse the various techniques for process synchronization and deadlock handling.	L4	Analyze
CO4	Apply the various techniques for memory management.	L3	Apply
CO5	Apply the methodologies used in secondary storage management strategies.	L3	Apply
CO6	Develop the solutions for the given problems using the operating system	L3	Apply

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://youtu.be/mXw9ruZaxzQ
2	https://youtu.be/vBURt97EkA
3	https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsClj82voMK3TMR0YE_f
4	4. https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO

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

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	

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).

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	10	10	20	20
Apply	20	20	30	30
analyze	20	20		
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyze	25
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

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

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

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-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.

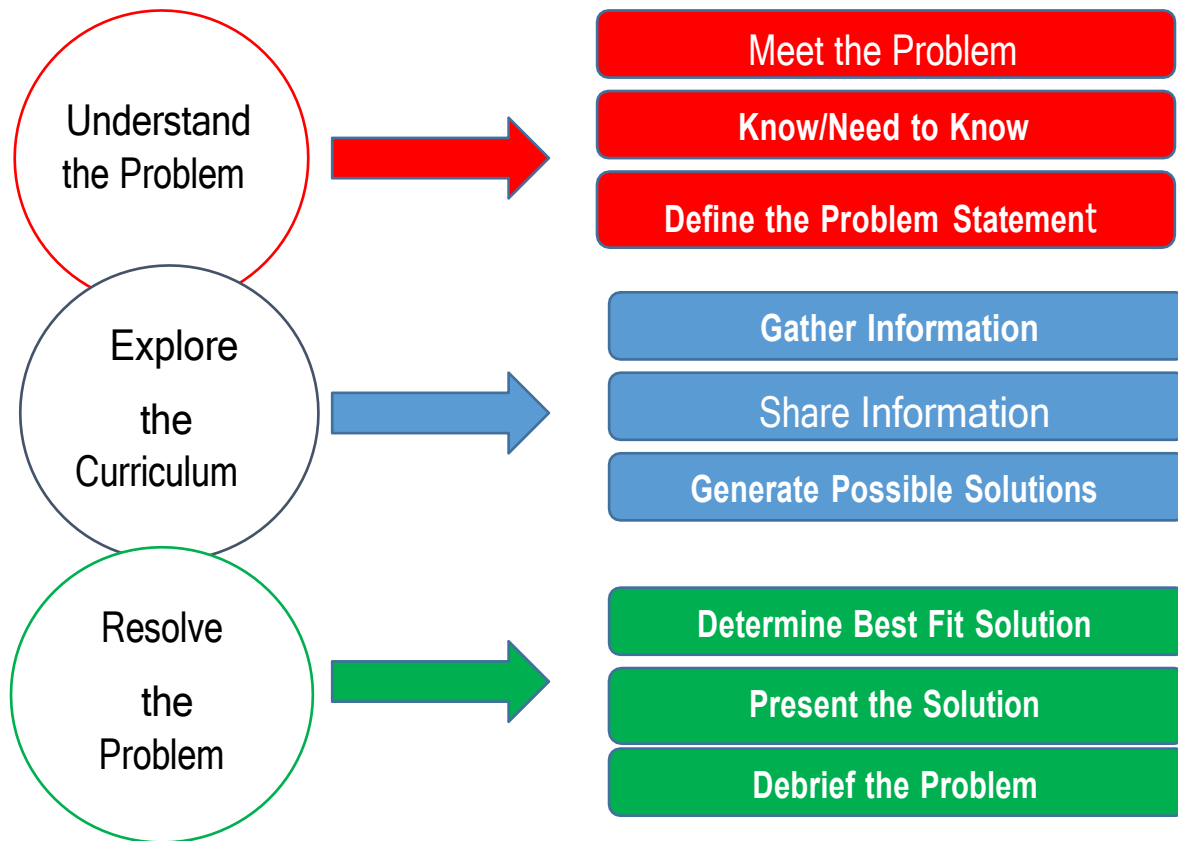
Phase 2:

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.

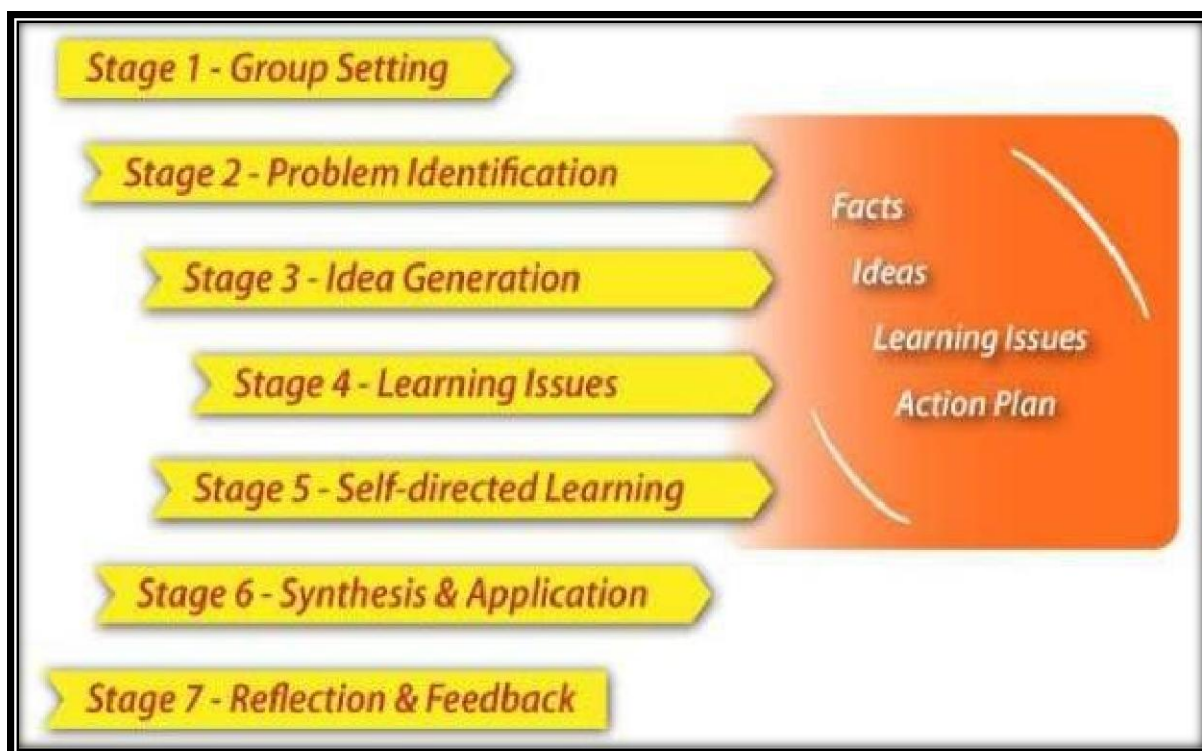
10. Obstacles/Gaps

- 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.
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Subject Identified for Project Based Learning

Semester	
Subject Identified for PBL	
Prerequisite	
Justification for the selected subject	
List of possible projects	

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd			
Course Title	:	Web Technologies			
Course Code	:	BCG306			
Course Type (Theory/ Practical/ Integrated)	:	Project			
Category	:	PBL			
Stream	:	CSD		CIE	: 05
Teaching hours/ week (L:T:P:S)	:	0:2:0:2		SEE	: 05
Total Hours	:	25 hours Theory + Project		SEE	: 03Hours
Credits	:	02		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
9991	Design and develop static and dynamic web pages
2	Familiarize with Client-Side Programming, Server-Side Programming, and Active server Pages
3	Learn Database Connectivity to web applications

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

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Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Design and develop static and dynamic web pages
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Teaching-Learning Process

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DSATM

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Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

List of Possible Projects

Sl. No.	Projects Details	COs
1	Course Registration System	C01-C04
2	Career Counseling Platform	C01-C04
3	Discussion Forum or Learning Management System (LMS)	C01-C04
4	School Event Calendar	C01-C04
5	Student Information System	C01-C04
6	Attendance Tracker	C01-C04
7	Library Management System	C01-C04
8	Gradebook Application	C01-C04
9	Basic Social Network	C01-C04
10	Event Sharing and RSVP Platform	C01-C04
11	Social Bookmarking Tool	C01-C04
12	Pet Adoption Network	C01-C04
13	Charity or Fundraising Platform	C01-C04
14	Movie Catalog Application	C01-C04
15	Movie Recommendation System	C01-C04
16	Movie Review Blog	C01-C04
17	Movie Character Database	C01-C04
18	Sports News Aggregator	C01-C04
19	Sports League Standings Tracker	C01-C04
20	Sports Event Management System	C01-C04
21	Sports Equipment Marketplace	C01-C04
22	Fitness Tracking App	C01-C04
23	Sports Social Network	C01-C04

24	Election Result Tracker	C01-C04
25	Political Opinion Polling Platform	C01-C04
	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	Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India. (ISBN:978-9332575271)
2	Zak Ruvalcaba Anne Boehm, "Murach's HTML5 and CSS3", 3rd Edition, Murachs / Shroff Publishers & Distributors Pvt Ltd, 2016. (ISBN:978-9352133246)

Reference Books

1	Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016. (ISBN:978-9332582736)
2	Nicholas C Zakas, "Professional JavaScript for Web Developers", 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088)

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Design web pages using mark-up languages HTML and XML.		
CO2	Design dynamic web pages using JavaScript as client-side scripting for data processing.		
CO3	Design dynamic web pages using PHP as server-side script for back-end data processing including database access.		

CO4	Design a web application using mark-up languages and PHP for client side and server-		
CO5	Export and Integrate Blender Assets into Game Engines		

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://www.coursera.org/learn/html-css-javascript-for-web-developers
2	https://colorwhistle.com/top-e-learning-web-apps/
3	https://www.geeksforgeeks.org/web-development/
4	https://bootcamp.berkeley.edu/resources/coding/learn-web-development/
5	https://developer.mozilla.org/en-US/docs/Learn
6	https://www.w3schools.com/whatis/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory	
	Continuous Assessment Tests (IAT)	Continuous Comprehensive Assessment (CCA)

	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	30			
Understand		30		
Apply	20	20	30	30
Analyse			20	20
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	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, CV)

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



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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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Project Based Learning – Review

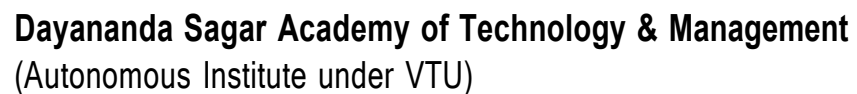
CONTINUOUS INTERNAL ASSESSMENT

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



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Project Based Learning Outcomes

[illegible]

**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

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Semester	:	3 rd			
Course Title	:	Game Development Tools			
Course Code	:	BCG307			
Course Type (Theory/ Practical/ Integrated)	:	Practical-Experiential Learning			
Category	:	AEC			
Stream	:	CSD		CIE	: 50Marks
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		SEE	: 50Marks
Total Hours	:	24		SEE	: 03Hours
Credits	:	1		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the Blender Interface and Basic Operations
2	Learn Advanced 3D Modeling Techniques
3	Master Texturing and Material Application
4	Develop Skills in Rigging and Animation
5	Integrate Blender Assets into Game Engines

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 Blender: Overview of Blender and its applications, Navigating Blender's interface, Basic operations: creating and manipulating objects. Create a simple 3D scene using basic shapes. Create a simple 3D model of an object (e.g., a chair).	5
Pedagogy	Lecture and Demonstration/Hands-On Lab/Assignment	
2	3D Modeling Basics: Introduction to 3D modeling concepts, Creating basic shapes and structures, Extrusion, scaling, and other transformation techniques, Detailed explanation of 3D modeling. Create a simple 3D model (e.g., a house). Model a more complex object (e.g., a car).	4
Pedagogy	Lecture and Demonstration/Hands-On Lab/Assignment	
3	Texturing and Materials: Basics of UV mapping, applying textures to 3D models, Creating and applying materials. Introduction to UV mapping and texturing. UV mapping and applying textures. Creating realistic materials using the shader editor, Texture and apply materials to the model created earlier	5
Pedagogy	Lecture and Demonstration/Hands-On Lab/Assignment	
4	Animation and Rigging: Introduction to rigging, creating armatures and bones, Basic and advanced animation techniques, Rigging and animation in Blender. Create a simple rig and animate basic movements. Animate a short sequence (e.g., walk cycle). Create a complex animation using advanced techniques.	5
Pedagogy	Lecture and Demonstration/Hands-On Lab/Assignment	
5	Exporting and Integration: Exporting models and animations from Blender, Importing Blender assets into Unity and Unreal Engine, Optimization and performance considerations, Exporting and importing assets. Export models and animations, import into Unity/Unreal. Common issues and solutions in asset integration. Integrate assets into a simple Unity or Unreal project	5

	• Lecture and Demonstration/Hands-On Lab/Assignment Project	
	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	"Blender 3D By Example" by Oscar Baechler and Xury Greer
2	"Blender for Dummies" by Jason van Gumster, comprehensive guide for beginners to learn Blender, covering basic to advanced topics.ISBN-13: 978-1119616962

Reference Books

1	"Blender 2.9: The beginner's guide" by Allan Brito, Focuses on the essential features and workflows in Blender 2.9, making it suitable for new users. ISBN-13: 978-1800560195
2	"Game Development with Blender" by Dalai Felinto and Mike Pan A practical guide to using Blender for game development, covering modeling, animation, and exporting assets to game engines. ISBN-13: 978-1937538442

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand Navigate and Utilize Blender Interface and Tools	Understand	L2
CO2	Apply Detailed and Optimized 3D Models	Apply	L3
CO3	Apply Textures and Materials to 3D Models	Apply	L3
CO4	Build Rig and Animate 3D Models	Analyse	L4
CO5	Analyse the Export and Integrate Blender Assets into Game Engines	Analyse	L4

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		3		2										
CO2			3		2										
CO3			3		2										
CO4			3		2										
CO5			3		2										

Weblinks and Video Lectures (e-Resources)

1	https://www.blender.org/ https://www.udemy.com/topic/blender/
2	https://docs.blender.org/manual/en/latest/
3	https://www.blenderguru.com/
4	https://cgcookie.com/ https://www.youtube.com/user/BlenderFoundation https://www.youtube.com/user/AndrewPPrice
5	https://docs.unity3d.com/Manual/HOWTO-ImportObjectBlender.html
6	https://docs.unrealengine.com/en-US/WorkingWithContent/Importing/Blender/index.html

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	20
Apply	40
Analyse	40
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

1 Credit Course – Practical

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

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

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

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

Continuous Internal Evaluation (CIE):

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

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

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

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

SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

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

**SOCIAL CONNECT
&
RESPONSIBILITY (SCR)**

SCR- Social Connect & Responsibility

Teaching Hours/Week (L: T: P: S)	0:0:2:0
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	100
SEE Marks	-----
Total Marks	100
Exam Hours	3
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.



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Semester	:	3rd			
Course Title	:	Social Connect and Responsibility			
Course Code	:	BSCK308			
Course Type (Theory/Practical/Project/ Integrated)	:	Practical			
Category	:	SCR			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		SEE	: -
Total Hours	:	55 hours		SEE	: -
Credits	:	1		Duration	

Course Learning Objectives: Students will be able to:

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

Teaching-Learning Process

General Instructions - Pedagogy :

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

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



DSATM

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

Contents :

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

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

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

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

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

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Communicate and connect to the surrounding.	Understand	L2
CO2	Create a responsible connection with the society.	Analyse	L2
CO3	Involve in the community in general in which they work.	Apply	L3
CO4	Notice the needs and problems of the community and involve them in problem -solving.	Apply	L3
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge	Analyse	L2

Mapping of Course Outcomes to Program Outcomes:

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

Activities:

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

PEDAGOGY:

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

COURSE TOPICS:

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

Duration :

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

Continuous Internal Evaluation (CIE):

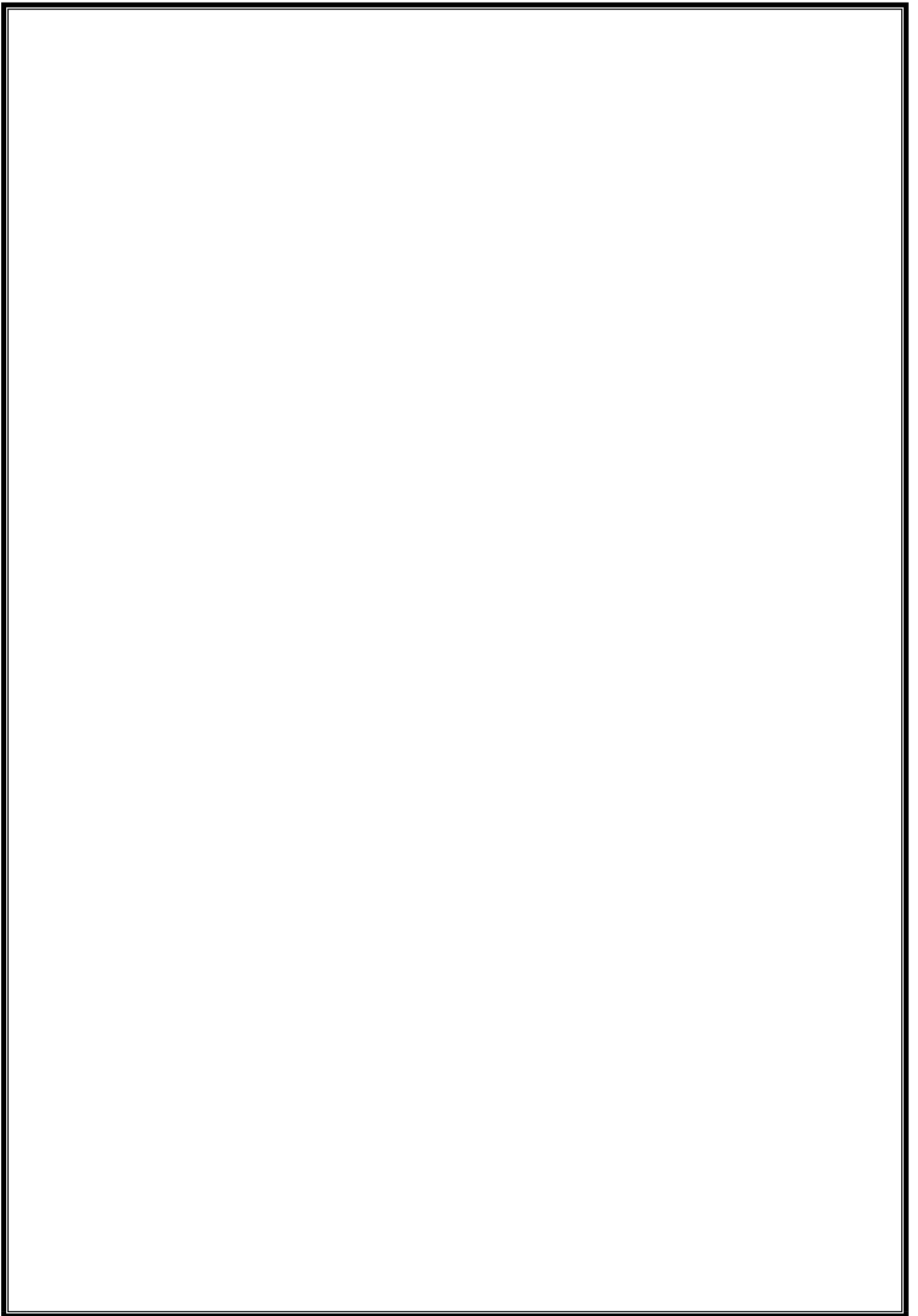
- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated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

Excellent : 80 to 100

Good : 60 to 79

Satisfactory : 40 to 59

Unsatisfactory and fail: <39



Pedagogy – Guidelines:

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

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

1 Credit Course – Practical + Planning**Assessment Details (both CIE and SEE)****NO SEE – Semester End Exam – Completely Practical and activities based evaluation****Plan of Action (Execution of Activities)**

Sl.No	Practice Session Description
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student At the end of semester with Report.
• Each student should do activities according to the scheme and syllabus. • At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion. • At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.	

Assessment Details for CIE (both CIE and SEE)

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

4th SEMESTER

**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

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

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	:	4th			
Course Title	:	Statistics, Probability and Optimization Techniques			
Course Code	:	BMATC401			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	CSD		CIE	: 50 Marks
Teaching hour/week (L:T:P:S)	:	3:0:0:0		SEE	: 50 Marks
Total Hours	:	40 Hrs		SEE Duration	: 3 Hours
Credits:	:	3			

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding Engineering problems
2	Use concepts of statistics, probability and Optimization techniques in solving problems
3	Analyze problems using concepts of statistics, probability and Optimization techniques
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	Hrs
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	Optimization Techniques Gradients of vector valued functions, gradients of matrices, Backpropagation and automatic differentiation, gradients in a deep network, The Gradient of Quadratic Cost, The Gradient of Mean Squared Error, Local and global optima, Optimization using gradient descent, Sequential search 3-point search.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

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, 4 th 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.
4	Convex Optimization: Algorithms and Complexity, S. Bubeck, Foundations and Trends in Optimization, 2015

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, 10 th Edition, 2018.
2	Higher Engineering Mathematics, B. S. Grewal, Khanna publishers, 44 th Edition, 2021

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, probability and optimization techniques	Remember, Understand	L1, L2
CO2	Apply techniques of statistics, probability and optimization techniques to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using statistics, probability and optimization techniques	Analyse	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://www.youtube.com/watch?v=0WYhD2r9-u8
3	https://youtu.be/pJFwJfSs6_c?si=W7kEBSMiQsCuG2L9

Assessment Pattern (both CIE and SEE)

Applied 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

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 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 **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** 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 **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 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)

	Theory	Practical
--	--------	-----------

Bloom's Category	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	
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	

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%

Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Introduction to Curve fitting.	1
1	Curve fitting (Least squares method).	1
1	Fitting of a straight line.	1
1	Fitting of a second-degree parabola.	1
1	Fitting of curves of the form $y=ab^x$.	1
1	Fitting of curves of the form $y=ae^{bx}$, $y=ax^b$	1
1	Correlation coefficient r , Regression lines	1
1	Rank Correlation.	1
2	Introduction on basic probability theory	1
2	Discrete random variables and Continuous random variables	1
2	Probability mass and density functions	1
2	Mathematical expectation, Mean and variance	1
2	Binomial distribution, Poisson distribution	1
2	Normal distribution	1
2	Exponential distribution	1
2	Weibull and uniform distribution	1
3	Introduction to Sampling Theory, Sampling distribution	1
3	Standard error, testing of hypothesis.	1
3	Central limit theorem.	1
3	Levels of significance.	1
3	Test of significance, Confidence limits.	1
3	Student's 't' distribution, Problems	1
3	Chi-square distribution as a test of goodness of fit.	1

3	F-Distribution, Problems.	1
4	Introduction to ANOVA.	1
4	The ANOVA technique.	1
4	Explanation on ANOVA technique.	1
4	Basic principle of ANOVA.	1
4	Explanation on one-way ANOVA.	1
4	Problems on one-way ANOVA.	1
4	Two-way ANOVA and Problems	1
4	Latin-square Design and Problems	1
5	Gradients of vector valued functions	1
5	Gradients of matrices	1
5	Backpropagation	1
5	Automatic differentiation	1
5	Gradients in a deep network, Gradient of Quadratic Cost, The Gradient of Mean Squared Error	1
5	Gradient of Quadratic Cost, The Gradient of Mean Squared Error	1
5	Optimization using gradient descent	1
5	Sequential search 3-point search	1
Total		40 Hrs



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th			
Course Title	:	Computer Graphics and Visualization			
Course Code	:	BCG402			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSD	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	:	50
Total Hours	:	40 hours Theory + 20 Hours of Practical Classes	SEE	:	3 Hours
Credits	:	4	Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand concepts of Computer Graphics along with its applications
2	Exploring mathematics for 2D and 3D graphics along with OpenGL API's
3	Use of Computer graphics in animation and GUI design.
4	Demonstrate Geometric transformations, viewing on both 2D and 3D objects.
5	Infer the representation of curves, surfaces, Colour and Illumination models

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)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Computer Graphics: Application of Computer Graphics. OpenGL: Introduction to OpenGL, coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL fill area functions, OpenGL Vertex arrays, Line drawing algorithm- Bresenham's. Text book 1: Chapter 1, 2	8
Pedagogy	QUIZ	
2	2D and 3D graphics with OpenGL: 2D Geometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates, OpenGL raster transformations, Transformation between 2D coordinate systems, OpenGL geometric transformation functions. 3D Geometric Transformations: 3D Translation, rotation, scaling, OpenGL geometric transformations functions Text book 1: Chapter 3	8
Pedagogy	Demonstration of the OpenGL 2D Geometric transformation	
3	Interactive Input Methods and Graphical User Interfaces: Graphical Input Data , Logical Classification of Input Devices, Input Functions for Graphical Data, OpenGL Interactive Input-Device Functions, OpenGL Menu Functions, Designing a Graphical User Interface. Computer Animation: Design of Animation Sequences, Traditional Animation Techniques, General Computer Animation Functions, Computer-Animation Languages, Character Animation, Periodic Motions, OpenGL Animation Procedures. Text Book 1: Chapter 4	8
Pedagogy	Demonstration of Computer Animation: Design of Animation Sequences	
4	Clipping: clipping window, normalization and viewport transformations, clipping algorithms, 2D point clipping, 2D line clipping algorithms: cohen-sutherland line clipping. Color	8

	Models: Properties of light, color models, RGB and CMY color models. Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection, specular and phong model. Text Book 1: Chapter 5	
Pedagogy	Demonstration of Configuration of Illumination Models	
5	3D Viewing:3D viewing concepts, 3D viewing pipeline, Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, OpenGL 3D viewing functions. Visible Surface Detection Methods: Classification of visible surface Detection algorithms, depth buffer method Text book 1: chapter 6	8
	Demonstration of the different types 3D viewing pipeline, Transformation	
	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Develop OpenGL program to draw a line using Bresenham's algorithm for all types of slopes	CO5
2	Develop OpenGL program to create and rotate a triangle about the origin and a fixed point.	CO5
3	Develop a OpenGL program to implement to recursively subdivide a tetrahedron to form 3D sierpinski gasket. The number of recursive steps is to be specified by the user.	CO4
4	Develop a OpenGL program to Spin 3D sierpinski gasket using OpenGL transformation matrices.	CO4
5	Develop a OpenGL program to Clip 2D lines using Cohen-Sutherland algorithm.	CO3
6	Develop a menu driven program to animate the polygon using 3D geometric transformations.	CO3
7	Develop a OpenGL program to draw a colour cube and allow the user to move the camera suitably to experiment with perspective viewing.	CO2
8	Develop a OpenGL program to draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene	CO2
9	Develop a OpenGL program to draw a simple scene containing few 3D objects and provide day and night effect. Define suitably the position and properties of the light source used in the scene.	CO2
Open ended Programs		

1	Create a dynamic 3D scene with various geometric shapes (e.g., cubes, spheres, and pyramids) that users can interact with.	
2	Develop a particle system that simulates natural phenomena, such as fire, smoke, or rain.	
3	Simple Game Engine: Build a basic game engine using OpenGL that supports 2D or simple 3D games. Include features like sprite rendering, user input handling, and collision detection etc.	

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Donald Hearn & Pauline Baker: Computer Graphics with OpenGL Version,4th Edition, Pearson Education, 2011

Reference Books

1	Edward Angel: Interactive Computer Graphics- A Top-Down approach with OpenGL, 5th edition. Pearson Education, 2009
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Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Demonstrate simple algorithms using OpenGL Graphics primitives and attributes., Analog and digital data transmission	L2	UNDERSTAND
CO2	Apply mathematical concepts for 2-D and 3-D geometric transformations.	L3	APPLY
CO3	Make use of OpenGL functions for Interactive Input, GUI and animations.	L3	APPLY
CO4	Explain clipping algorithms, colour models and illumination models	L3	APPLY
CO5	Demonstrate visualization of surfaces and 3D objects.	L3	APPLY

Mapping of Course Outcomes to Program Outcomes:

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

CO4	3	3	3		3								3	3	
CO5					3								3	3	

Weblinks and Video Lectures (e-Resources)

1	https://nptel.ac.in/courses/106/106/106106090/
2	https://nptel.ac.in/courses/106/102/106102063/
3	https://nptel.ac.in/courses/106/103/106103224/
4	https://nptel.ac.in/courses/106102065
5	http://www.opengi-redbook.com/
6	https://www.opengi.org/

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	5	-	-	-
Understand	20	20	10	10	-
Apply	20	20	20	20	25
Analyse	5	2	20	20	25
Evaluate					
Create					

CIE Course Assessment Plan

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

CO5						20	20	20%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th			
Course Title	:	DESIGN AND ANALYSIS OF ALGORITHMS			
Course Code	:	BCG403			
Course Type (Theory/ Practical/ Project/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40 hours Theory + 20 Hours of Practical Classes		SEE	: 3 Hours
Credits	:	4		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To learn the methods for analyzing algorithms and evaluating their performance.
2	To demonstrate the efficiency of algorithms using asymptotic notations
3	To solve problems using various algorithm design methods, including brute force, greedy, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking, and branch and bound
4	To learn the concepts of P and NP complexity classes.

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.

- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- 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)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	INTRODUCTION: What is an Algorithm?, Fundamentals of Algorithmic Problem Solving. FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms, Mathematical Analysis of Recursive Algorithms. BRUTE FORCE APPROACHES: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching. Chapter 1 (Sections 1.1,1.2), Chapter 2(Sections 2.1,2.2,2.3,2.4), Chapter 3(Section 3.1,3.2)	8
Pedagogy	Quiz	
2	BRUTE FORCE APPROACHES (contd.): Exhaustive Search (Travelling Salesman problem and Knapsack Problem). DECREASE-AND-CONQUER: Insertion Sort, Topological Sorting. DIVIDE AND CONQUER: Merge Sort, Quick Sort, Binary Tree Traversals, Multiplication of Large Integers and Strassen's Matrix Multiplication. Chapter 3(Section 3.4), Chapter 4 (Sections 4.1,4.2), Chapter 5 (Section 5.1,5.2,5.3, 5.4)	8
Pedagogy	Demonstration of Sorting Algorithms with poster presentation	
3	TRANSFORM-AND-CONQUER: Balanced Search Trees, Heaps and Heapsort. SPACE-TIME TRADEOFFS: Sorting by Counting: Comparison counting sort, Input Enhancement in String Matching: Horspool's Algorithm. Chapter 6 (Sections 6.3,6.4), Chapter 7 (Sections 7.1,7.2)	8
Pedagogy	Case study	
4	DYNAMIC PROGRAMMING: Three basic examples, The Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. THE GREEDY METHOD: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes. Chapter 8 (Sections 8.1,8.2,8.4), Chapter 9 (Sections 9.1,9.2,9.3,9.4)	8
Pedagogy	Demonstration / Problem based learning	
5	LIMITATIONS OF ALGORITHMIC POWER: Decision Trees, P, NP, and NP-Complete Problems. COPING WITH LIMITATIONS OF ALGORITHMIC POWER: Backtracking (n-Queens problem, Subset-sum problem), Branch-and-Bound (Knapsack problem), Approximation algorithms for NP-Hard problems (Knapsack problem). Chapter 11 (Section 11.2, 11.3), Chapter 12 (Sections 12.1,12.2,12.3)	8
	Debate/Demonstration of the different types of algorithms with limitations	
	Pedagogical Initiatives (Not limited to): • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily.	

- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Design and implement C/C++ Program to find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm.	CO5
2	Design and implement C/C++ Program to find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm	CO5
3	a. Design and implement C/C++ Program to solve All-Pairs Shortest Paths problem using Floyd's algorithm. b. Design and implement C/C++ Program to find the transitive closure using Warshal's algorithm	CO4
4	Design and implement C/C++ Program to find shortest paths from a given vertex in a weighted connected graph to other vertices using Dijkstra's algorithm.	CO4
5	Design and implement C/C++ Program to obtain the Topological ordering of vertices in a given digraph.	CO3
6	Design and implement C/C++ Program to solve 0/1 Knapsack problem using Dynamic Programming method.	CO3
7	Design and implement C/C++ Program to solve discrete Knapsack and continuous Knapsack problems using greedy approximation method.	CO2
8	Design and implement C/C++ Program to find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d .	CO2
9	Design and implement C/C++ Program to sort a given set of n integer elements using Selection 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.	CO2
10	Design and implement C/C++ Program for N Queen's problem using Backtracking	CO4
Open ended Programs		
1	Design and implement Advanced Pathfinding Algorithm	
2	Design and build Algorithm Efficiency Analyzer	
3	Design and implement Dynamic Programming Solutions for the Knapsack and continuous Knapsack problems	

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, By Anany Levitin, 3rd Edition (Indian), 2017, Pearson
2	Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press

Reference Books

1	Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2	Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3	Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time complexity.	L3	UNDERSTAND
CO2	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems.	L2	APPLY
CO3	Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems.	L3	APPLY
CO4	Apply greedy and input enhancement methods to solve graph & string based computational problems.	L3	APPLY
CO5	Analyse various classes (P, NP and NP Complete) of problems and Illustrate backtracking, branch & bound and approximation methods	L2	ANALYSE

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://nptel.ac.in/courses/106/102/106102063/
2	https://nptel.ac.in/courses/106/103/106103224/

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	5	-	-	-
Understand	20	20	10	10	-
Apply	20	20	20	20	25
Analyse	5	2	20	20	25
Evaluate					
Create					

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

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	:	4th			
Course Title	:	Database Management System			
Course Code	:	BCG404			
Course Type (Theory/ Practical/Project/Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40 Hours		SEE	: 03Hours
Credits	:	03		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To Provide a strong foundation in database concepts, technology, and practice.
2	To Practice SQL programming through a variety of database problems
3	To Understand the relational database design principles.
4	To Demonstrate the use of concurrency and transactions in database.
5	To 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:

- 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.

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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)

Module No.	Topics	Hours
1	Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams, Specialization and Generalization. Textbook 1: Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10	08
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
2	Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. Textbook 1: Ch 5.1 to 5.3, Ch 8.1 to 8.5; Ch 9.1 to 9.2 Textbook 2: 3.5	08
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
3	Normalization: Database Design Theory - Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. SQL: SQL data definition and data types, Schema change statements in SQL, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL Textbook 1: Ch 14.1 to 14.7, Ch 6.1 to 6.5	08

Pedagogy		
4	SQL: Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL. 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. Textbook 1: Ch 7.1 to 7.3, Ch 20.1 to 20.6	08
Pedagogy		
5	Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. NOSQL Databases and Big Data Storage Systems: Introduction to NOSQL Systems, The CAP Theorem, Document-Based NOSQL Systems and MongoDB, NOSQL Key-Value Stores, Column-Based or Wide Column NOSQL Systems, NOSQL Graph Databases and Neo4j Textbook 1: Chapter 21.1 to 21.5, Chapter 24.1 to 24.6	08
	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	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

Reference Books

1	"Database Systems: The Complete Book", Garcia-Molina, J D Ullman, Widom, 2nd Edition, Prentice-Hall, 2008.
2	"Database System Concepts", Silberschatz, H Korth, S Sudarshan, 6th Edition, McGraw-Hill, 2010.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Describe the basic elements of a relational database management system	Understand	L2
CO2	Design entity relationship for the given scenario.	Apply	L3
CO3	Apply various Structured Query Language (SQL) statements for database manipulation.	Apply	L3
CO4	Analyze various normalization forms for the given application.	Analyze	L4
CO5	Develop database applications for the given real world	Analyze	L4

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				2	1						2			
CO2		3	3		2			1							
CO3	3														
CO4	3														
CO5	3														

Weblinks and Video Lectures (e-Resources)

1	https://www.w3schools.com/sql
2	https://www.khanacademy.org/computing/computer-programming/sql
3	https://docs.oracle.com/en/database/
4	https://dev.mysql.com/doc/

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		20	
Apply	30	20	30	20
Analyse		30		30
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution	Weightage
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	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5	Total Marks	
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%





Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th			
Course Title	:	Computer Network			
Course Code	:	BCG405			
Course Type (Theory/Practical/Project/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSD		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	: 50
Total Hours	:	40Hours		SEE	: 03Hours
Credits	:	03		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission
2	Learn the channel allocation, framing, error and flow control techniques.
3	Work with various functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.
4	Differentiate the Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.
5	Acquire knowledge about different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET

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: overview of the internet, protocol layering, internet history, standards and administration, application layer: introduction, client-server paradigm, standard client-server applications, peer-to-peer paradigm, socket interface programming Text book 1: chapter 1, 2	8
Pedagogy	Chalk and talk/ Think and pair/PowerPoint Presentation/Videos	
2	Transport Layer: Introduction, Transport-Layer Protocols, User Datagram Protocol (UDP), Transmission Control Protocol (TCP) Text book 1: Chapter 3	8
Pedagogy	Chalk and talk/ Case Study/PowerPoint Presentation/Videos	
3	Network Layer: Introduction, Network-Layer Protocols, Unicast Routing, Multicast Routing, Next Generation Ip Text Book 1: Chapter 4	8
Pedagogy	Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
4	Data-Link Layer: Wired Networks: Introduction, Data Link Control (DLC), Multiple Access Protocols (MAC), Link-Layer Addressing, Wired Lans: Ethernet Protocol, Other Wired Networks, Connecting Devices Text Book 1: Chapter 5	8
Pedagogy	Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
5	Physical Layer and Transmission Media: Data and Signals, Digital Transmission, Analog Transmission, Bandwidth Utilization, Transmission Media Text book 1: chapter 6	8
	• Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
	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	Computer Networks: A Top-Down Approach Behrouz A. Forouzan and Firouz Mosharraf
Reference Books	
1	Andrew Tanenbaum "Computer Networks", Prentice Hall. 3. William Stallings, "Data and Computer Communication", Pearson.
2	Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson
3	W. A. Shay, "Understanding Communications and Networks", Cengage Learning.
4	D. Comer, "Computer Networks and Internets", Pearson

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog	Understand	L2
CO2	Apply channel allocation, framing, error and flow control techniques.	Apply	L3
CO3	Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.	Analyze	L4
CO4	Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.	Apply	L3
CO5	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET	Analyze	L4

Mapping of Course Outcomes to Program Outcomes:

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

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

Weblinks and Video Lectures (e-Resources)

1	https://www.my-mooc.com/en/video/tcp-ip-model-explained-tcp-ip-model-animation-tcp-ip-protocol-suite-tcp-ip-layers-
2	https://www.linkedin.com/posts/telecomhall_easily-explained-amazing-animation-of-the-activity-
3	https://www.youtube.com/watch?v=bj-Yfakjllc&list=PLIFyRwBY_4bRLmKfP1KnZA6rZbRHtxmXi
4	https://www.youtube.com/watch?v=E5bSumTAHZE&list=PLIFyRwBY_4bRLmKfP1KnZA6rZbRHtxmXi&index=12
5	https://www.youtube.com/watch?v=BWZ-MHlhqjM&list=PLIFyRwBY_4bQUE4IB5c4VPRyDoLgOdExE
6	https://www.youtube.com/watch?v=IjS07YTEJ2I&list=PLIFyRwBY_4bQUE4IB5c4VPRyDoLgOdExE&index=2

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution		Weightage
	Test-1	Test-2	

	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5	Total Marks	
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		30	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

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

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

17. Introduction

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

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

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

18. Characteristics of Project-Based Learning:

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

19. Purpose

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

20. Objectives

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

21. Why Incorporate PBL?

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

22. Benefits of PBL

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

23. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.
 - Level 1** - 2nd Year - 3rd Semester & 4th Semester
 - Level 2** - 3rd year - 5th Semester & 6th Semester
 - Level 3** - Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.

- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks
2. During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

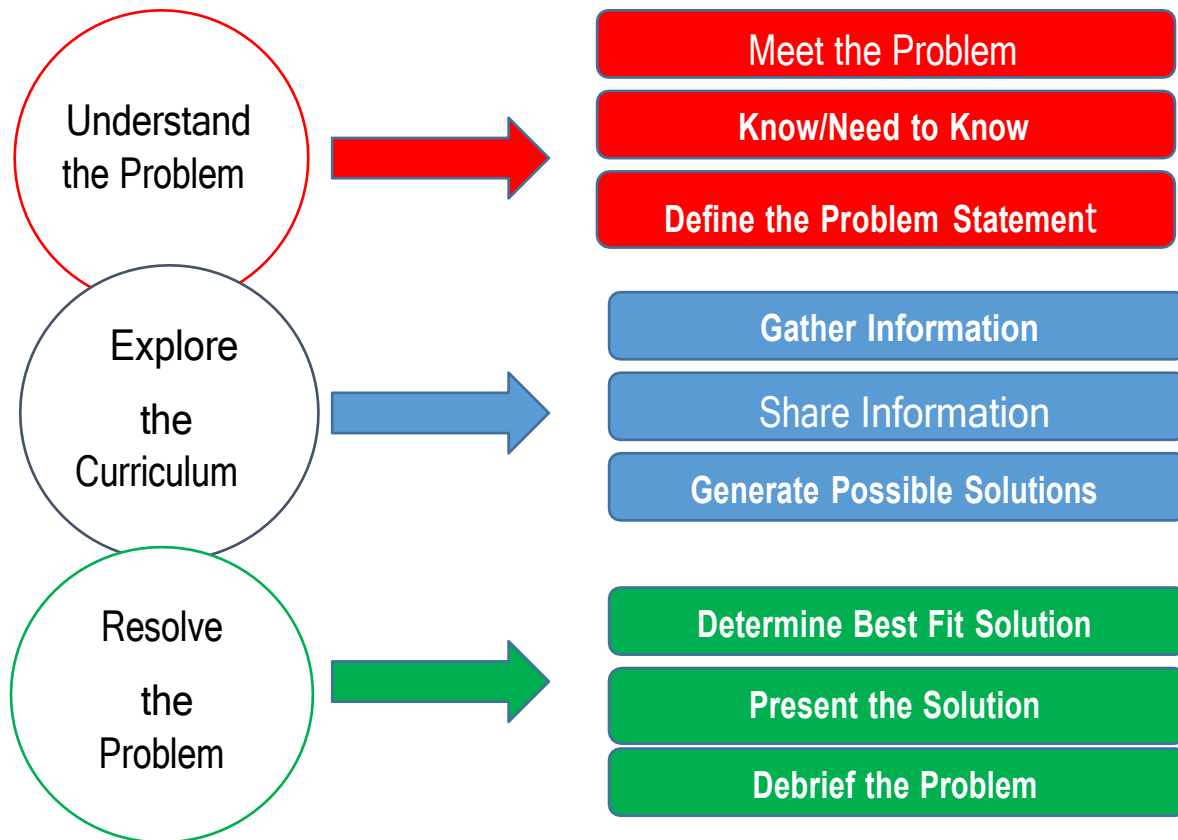
Phase 2:

1. Phase 2 is for 11 Weeks
2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

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

24. PBL Teaching and Learning Template



25. Practice

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

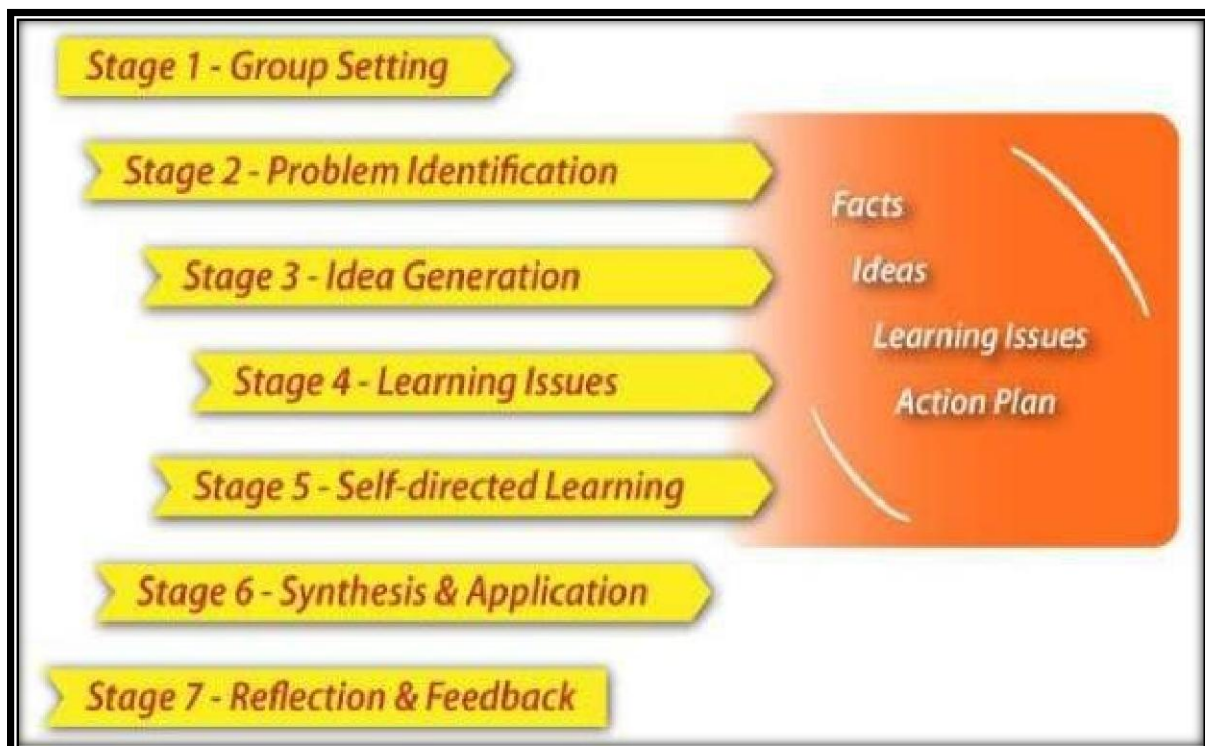
26. Obstacles/Gaps

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

27. How to Overcome?

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

28. Block diagram of PBL



29. Impact Analysis

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

30. PBL – Guidelines

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

14.1 Main phases of the project

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

14.2 Final Presentation Structure

10. Title of the project & Batch Information
11. Agenda / Topics
12. Problem Statement / Project Definition
13. Background / Literature Review
14. Methodology
15. Analysis and Design
16. Implementation
17. Testing
18. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

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

31. 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.

32. 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.
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Subject Identified for Project Based Learning

Semester	
Subject Identified for PBL	
Prerequisite	
Justification for the selected subject	
List of possible projects	

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4th			
Course Title	:	Database Management System Laboratory			
Course Code	:	BCG406			
Course Type (Theory/Practical/Project/ Integrated)	:	Project			
Category	:	PBL			
Stream	:	CSD	CIE	:	50Marks
Teaching hours/ week (L:T:P:S)	:	0:2:0:2	SEE	:	50Marks
Total Hours	:	25 Hours-Theory+ Project	SEE	:	3Hours
Credits	:	2	Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Develop a strong foundational understanding of database concepts and technologies.
2	Understand and apply relational database design principles, including concurrency control and transaction management.
3	Apply basic and advanced SQL programming for diverse database applications.

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)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Develop a strong foundational understanding of database concepts and technologies.
2	Understand and apply relational database design principles, including concurrency control and transaction management.
3	Apply basic and advanced SQL programming for diverse database applications.

Teaching-Learning Process

Pedagogical Initiatives:

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- 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)

List of Possible Projects

Sl. No.	Projects	COs
1	University Examination Management System: Manage exam schedules, student registrations, question papers, and results processing.	CO1, CO2, CO3
2	Blood Bank Management System: Track donor details, blood inventory, requests, and distribution.	CO1, CO2, CO3
3	Smart City Traffic Management System: Manage traffic signals, vehicle registrations, and congestion analysis.	CO1, CO2, CO3
4	Online Food Ordering System: Handle restaurant menus, customer orders, delivery tracking, and payments.	CO1, CO2, CO3
5	Library Automation System: Automate book borrowing/return, member management, and inventory tracking.	CO1, CO2, CO3
6	College Fest Management System: Manage event schedules, participant registrations, and sponsorship details.	CO1, CO2, CO3
7	Online Voting System: Secure system for voter registrations, candidate details, and voting process.	CO1, CO2, CO3
8	Freight Management System: Manage shipment tracking, logistics, and delivery schedules.	CO1, CO2, CO3
9	Healthcare Information System: Centralized database for patient records, prescriptions, and medical history.	CO1, CO2, CO3
10	Online Examination System: Handle online tests, question banks, and automated grading.	CO1, CO2, CO3
11	Personal Finance Management System: Track income, expenses, budgeting, and financial planning.	CO1, CO2, CO3
12	E-learning Platform: Manage courses, student enrollments, progress tracking, and certifications.	CO1, CO2, CO3
13	Document Management System: Organize, store, and retrieve documents securely.	CO1, CO2, CO3
14	Campus Recruitment System: Manage job postings, student applications, and interview schedules.	CO1, CO2, CO3
15	Rental Property Management System: Handle property listings, tenant details, and lease agreements.	CO1, CO2, CO3
16	Online Auction System: Manage auction listings, bidding process, and payment transactions.	CO1, CO2, CO3
17	Digital Voting System: Secure system for conducting elections and tallying votes.	CO1, CO2, CO3
18	Customer Relationship Management System: Track customer interactions, sales, and support tickets.	CO1, CO2, CO3

19	Supply Chain Management System: Manage suppliers, inventory, orders, and logistics.	CO1, CO2, CO3
20	School Timetable Management System: Automate timetable creation, teacher schedules, and class management.	CO1, CO2, CO3
21	Hotel Booking System: Handle room bookings, customer details, check-in/check-out, and billing.	CO1, CO2, CO3
22	Gym Membership System: Manage member details, subscriptions, attendance, and trainer schedules.	CO1, CO2, CO3
23	Loan Management System: Track loan applications, approvals, repayments, and interest calculations.	CO1, CO2, CO3
24	Waste Collection Management System: Schedule waste pickups, track routes, and manage billing.	CO1, CO2, CO3
25	E-commerce Product Recommendation System: Personalized product recommendations based on user behavior.	CO1, CO2, CO3
26	Vehicle Maintenance Management System: Track service schedules, repair history, and parts inventory.	CO1, CO2, CO3
27	Online Pharmacy System: Manage drug inventory, prescriptions, and customer orders.	CO1, CO2, CO3
28	Travel Booking System: Handle bookings for flights, hotels, and holiday packages.	CO1, CO2, CO3
29	Fleet Management System: Track vehicle usage, maintenance, fuel consumption, and driver details.	CO1, CO2, CO3
30	Online Job Portal: Manage job postings, applicant resumes, and employer details.	CO1, CO2, CO3
31	Community Forum System: Online platform for discussion threads, user posts, and moderation.	CO1, CO2, CO3
32	Hospital Bed Management System: Track bed occupancy, patient admissions, and discharge schedules.	CO1, CO2, CO3
33	Event Ticketing System: Manage ticket sales, attendee details, and event schedules.	CO1, CO2, CO3
34	Weather Forecasting System: Store and analyze weather data, provide forecasts and alerts.	CO1, CO2, CO3
35	Charity Management System: Manage donor details, donation tracking, and fund distribution.	CO1, CO2, CO3
36	Pet Adoption System: Track pet profiles, adoption applications, and foster details.	CO1, CO2, CO3
37	College Course Management System: Manage course offerings, enrollments, and academic records.	CO1, CO2, CO3
38	Visitor Management System: Track visitor registrations, appointments, and access control.	CO1, CO2, CO3
39	Online Grocery Store: Manage product listings, customer orders, and delivery logistics.	CO1, CO2, CO3
40	Subscription Box Service: Handle subscription plans, customer preferences, and shipment tracking.	CO1, CO2, CO3
41	Music Streaming Service: Manage music libraries, user playlists, and streaming analytics.	CO1, CO2, CO3

42	Volunteer Management System: Track volunteer registrations, event participation, and schedules.	CO1, CO2, CO3
43	Online Tutoring Platform: Manage tutor profiles, student bookings, and lesson schedules.	CO1, CO2, CO3
44	Smart Home Management System: Control and monitor home devices, energy usage, and security.	CO1, CO2, CO3
45	Restaurant Inventory System: Track food inventory, supplier details, and order management.	CO1, CO2, CO3
46	Event Feedback System: Collect and analyze attendee feedback for events and conferences.	CO1, CO2, CO3
47	Peer-to-Peer Lending System: Manage loan applications, approvals, repayments, and investor details.	CO1, CO2, CO3
48	Sports Club Management System: Track member details, event schedules, and team management.	CO1, CO2, CO3
49	Retail POS System: Manage sales transactions, inventory, and customer details.	CO1, CO2, CO3
50	Freelance Marketplace: Connect freelancers with clients, manage job postings, and payment processing.	CO1, CO2, CO3
	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	Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2	Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

Reference Books

1	"Database Systems: The Complete Book", Garcia-Molina, J D Ullman, Widom, 2 nd Edition, Prentice-Hall, 2008.
2	"Database System Concepts", Silberschatz, H Korth, S Sudarshan, 6th Edition, McGraw-Hill, 2010.

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 and transaction management in databases.	L2	Understand
CO2	Apply the fundamental concepts and transaction management in databases.	L3	Apply
CO3	Design and implement relational databases.	L4	Analyze
CO4	Develop basic and advanced SQL commands for database manipulation	L3	Apply
CO5	Build basic and advanced SQL commands for database manipulation	L5	Evaluate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1	1	1	1	1	1			
CO2	3	2	3	2	2	1	1	1	2	2	3	3			
CO3	3	2	2	2	3	1	1	1	1	2	1	3			
CO4															
CO5															

Weblinks and Video Lectures (e-Resources)

1	https://www.coursera.org/learn/database-management
2	https://www.coursera.org/learn/intro-sql
3	https://www.my-mooc.com/en/mooc/intro-to-relational-databases--ud197

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	25	25		
Apply	25	25	25	30
Analyse			25	20
Evaluate				
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%



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6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

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



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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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Project Based Learning – Review

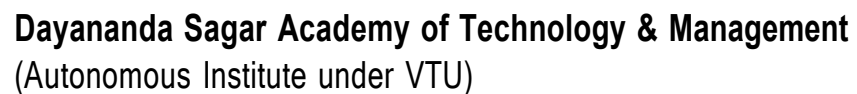
CONTINUOUS INTERNAL ASSESSMENT

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



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Project Based Learning Outcomes

[illegible]

**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

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Semester	:	4th			
Course Title	:	Design Processes and Perspectives			
Course Code	:	BCG407			
Course Type (Theory/Practical/Project/ Integrated)	:	Practical-Experiential Learning			
Category	:	AEC			
Stream	:	CSD	CIE	:	50Marks
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	:	50Marks
Total Hours	:	24 Hours	SEE	:	03Hours
Credits	:	2	Duration		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand Fundamental Design Principles
2	Master Design Processes and Methodologies
3	Develop User-Centered Design Skills
4	Explore Cultural and Technological Influences
5	Foster Creative Thinking and Problem-Solving

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 Design Principles: Design Elements: Line, Shape, Color, Texture, Space, Design Principles: Balance, Contrast, Emphasis, Movement, Proportion, Rhythm, Unity, History of Design: Key Movements and Influences, Aesthetics in Design: Visual Appeal and Beauty, Functionality and Usability: Designing for User Needs, Introduction to design principles and elements. Analysis of historical design movements Software Tools: Adobe Illustrator, Sketch, Figma	5
Pedagogy	Lecture and Discussion, Case Studies, Design Critiques	
2	Design Processes and Methodologies: Design Thinking: Empathize, Define, Ideate, Prototype, Test, Agile and Lean Design: Principles and Practices, User Research Methods: Surveys, Interviews, Observation, Prototyping Techniques: Low-Fidelity and High-Fidelity Prototypes, Usability Testing: Planning, Conducting, and Analyzing Tests. Software Tools : Adobe XD, Invision, Axure RP	4
Pedagogy	Lecture and Discussion, Case Studies, Design Critiques	
3	User-Centered Design and Experience: User-Centered Design Principles, Creating User Personas: Characteristics, Needs, Goals, User Journey Mapping: Touchpoints, Pain Points, Opportunities, Accessibility in Design: Principles and Best Practices, Inclusive Design: Designing for Diverse User Groups. Software Tools : Miro, Lucidchart, Adobe Acrobat	5
Pedagogy	Lecture and Discussion, Case Studies, Design Critiques	
4	Cultural, Social, and Technological Influences on Design: Cultural Influences on Design: Global Perspectives, Social Impact of Design: Addressing Social Issues through Design, Technological Advancements: Influence on Design Practices, Ethical Design: Principles and Case Studies, Sustainability in Design: Environmental Considerations	5
Pedagogy	Lecture and Discussion, Case Studies, Design Critiques	
5	Creative Thinking and Problem-Solving in Design: Creativity in Design: Principles and Techniques, Brainstorming Methods: Mind Mapping, SCAMPER, Six Thinking Hats, Design Challenges: Solving Real-World Problems, Evaluating Design Solutions: Criteria and Methods, Presenting Design Ideas: Communication and Persuasion	5
Pedagogical Initiatives (Not limited to): Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another Problem Solving: encourages cognitive thinking and enables creative problem solving Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. Case studies: maps different domains in real time applications		

	• Demonstration: exhibits the implementation process
--	---

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	The Design of Everyday Things" by Don Norman
2	Design Thinking: Understanding How Designers Think and Work" by Nigel Cross
3	Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley

Reference Books

1	Designing Brand Identity: An Essential Guide for the Whole Branding Team" by Alina Wheeler
2	Lean UX: Applying Lean Principles to Improve User Experience & quot; by Jeff Gothelf and Josh Seiden
3	The Visual Display of Quantitative Information & quot; by Edward R. Tufte

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 Application of Design Principles	Understand	L2
CO2	Design the different Design Methodologies	Apply	L3
CO3	Creation of User-Centered Designs by analyzing the pattern	Analyse	L4
CO4	Critical Analysis of Design Influences	Apply	L3
CO5	Innovative Problem-Solving in Design	Analyse	L4

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		3		2				3		2				
CO2			3		2				3						
CO3	1		3		2				3						
CO4			3		2										
CO5	1		3		2				3						

Weblinks and Video Lectures (e-Resources)

1	https://www.ideo.com/pages/design-thinking
2	https://www.nngroup.com/articles/
3	https://www.smashingmagazine.com/category/design/
4	https://alistapart.com/
5	https://www.interaction-design.org/literature
6	https://www.designcouncil.org.uk/our-work/how-we-teach-and-support/design-methods/
7	https://medium.com/topic/design
8	https://www.coursera.org/browse/arts-and-humanities/design

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	20
Apply	40
Analyse	40
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5	5	5		35	35%
CO3			15	10	10		35	35%
CO4					5	15	20	20%
CO5								
Total	15	15	20	15	20	15	100	100%

1 Credit Course – Practical

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

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

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

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

Continuous Internal Evaluation (CIE):

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

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

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

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

SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

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

**SOCIAL CONNECT
&
RESPONSIBILITY (SCR)**

SCR- Social Connect & Responsibility

Teaching Hours/Week (L: T: P: S)	0:0:0:2
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	100
SEE Marks	-----
Total Marks	100
Exam Hours	3
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.



Dayananda Sagar Academy of Technology & Management
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Semester	:	4th			
Course Title	:	Universal Human Values			
Course Code	:	BUHK408			
Course Type (Theory/Practical/Project/ Integrated)	:	Practical			
Category	:	UHV			
Stream	:	CSD		CIE	: 100
Teaching hours/ week (L:T:P:S)	:	0:0:2:0		SEE	: -
Total Hours	:	50 hours		SEE	: -
Credits	:	1		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4	This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

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.

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

Module No.	Topics	Hours
1	Introduction to Value Education Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - the Basic Human Aspirations, Happiness and Prosperity - Current Scenario, Method to Fulfil the Basic Human Aspirations	3
Pedagogy		
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		
3	Harmony in the Family and Society : Harmony in the Family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human-toHuman Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	3
Pedagogy		
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		

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

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	Understand	L2
CO2	They would have better critical ability.	Analyse	L2
CO3	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	Apply	L3
CO4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this	Apply	L3

Mapping of Course Outcomes to Program Outcomes:

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

Activities:

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

PEDAGOGY:

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

COURSE TOPICS:

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

Duration :

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

Continuous Internal Evaluation (CIE):

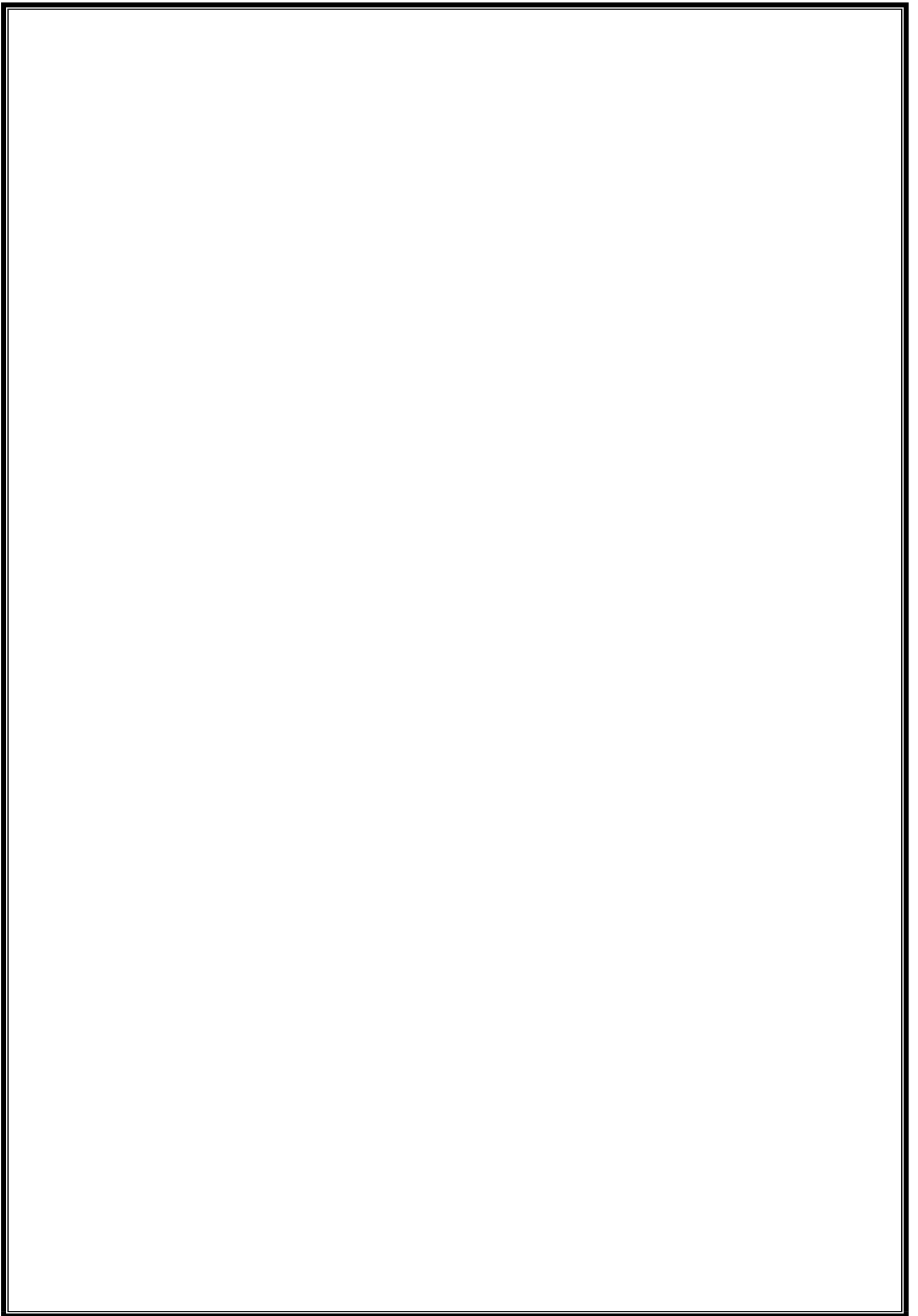
- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated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

Excellent : 80 to 100

Good : 60 to 79

Satisfactory : 40 to 59

Unsatisfactory and fail: <39



Pedagogy – Guidelines:

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

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

1 Credit Course – Practical + Planning**Assessment Details (both CIE and SEE)****NO SEE – Semester End Exam – Completely Practical and activities based evaluation****Plan of Action (Execution of Activities)**

Sl.No	Practice Session Description
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student At the end of semester with Report.
• Each student should do activities according to the scheme and syllabus. • At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion. • At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.	

Assessment Details for CIE (both CIE and SEE)

Weightage	CIE – 100%	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study-based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25	25 Marks	
Total marks for the course in each semester	100 Marks	

For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.