



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3 rd			
Course Title	:	Mathematics-III for Computer Science & Allied Branches			
Course Code	:	BMATB301			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	Common to CSE & Allied branches	CIE	:	50 Marks
Teaching hour/week (L:T:P:S)	:	2:2:0:0	SEE	:	50 Marks
Total Hours	:	50 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 probability, statistics, sampling theory, ANOVA and logic in solving problems
3	Analyze problems using concepts of probability, statistics, sampling theory, ANOVA and logic
4	Analysis of various real time problems using the skills acquired

Teaching-Learning Process

Pedagogy (General Instructions):

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

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



DSATM

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

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	MODULE-I: Statistics Introduction, Curve fitting (Least squares method), Fitting of a straight line, Fitting of a second degree parabola, Fitting of curves of the form $y=ab^x$, $y=ae^{bx}$, $y=ax^b$, Correlation and Correlation coefficient r , Regression lines, Rank Correlation.	10
Pedagogy	Chalk and board, group discussion, ppt, videos	
2	MODULE – II: 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 and Exponential distributions.	10
Pedagogy	Chalk and board, group discussion, ppt, videos	
3	MODULE-III: Sampling Theory Introduction, sampling distribution, standard error, testing of hypothesis, central limit theorem, levels of significance, test of significance, confidence limits, student's 't' distribution, Chi-square distribution as a test of goodness of fit, F-Distribution.	10
Pedagogy	Chalk and board, group discussion, ppt, videos	
4	MODULE-IV: ANOVA The ANOVA technique, basic principle of ANOVA, one-way ANOVA, Two-way ANOVA, Latin-square Design	10
Pedagogy	Chalk and board, group discussion, ppt, videos	
5	MODULE-V: 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.	10
Pedagogy	Chalk and board, group discussion, ppt, videos	

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

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 Fundamentals of Statistics by Srijib Bhushan, ISBN: 9789355428752, 9355428758

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 probability, statistics, sampling theory, ANOVA and logic	Remember, Understand	L1, L2
CO2	Apply techniques of probability, statistics, sampling theory, ANOVA and logic to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using probability, statistics, sampling theory, ANOVA and logic	Analyse	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	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	--	3	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	--	2	--	--	--	--	1	1	--	--	--	--

Weblinks and Video Lectures (e-Resources)

1	https://tinyurl.com/43fve5na
2	https://rb.gy/csqq72
3	https://tinyurl.com/y7e8mx5z
4	http://www.class-central.com/subject/math(MOOCs)
5	http://academicearth.org/
6	VTU e-Shikshana Program
7	VTU EDUSAT Program

Assessment Pattern (both CIE and SEE)

Applied Science Courses								
4 credits - Theory								
Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50			20	
CIE	Theory	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	25	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
Total CIE Theory						50	20	Scale down Marks of IAT and CCA to 50

SEE		Theory exam	Entire theory syllabus including questions from lab component	100	---	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	
				<ul style="list-style-type: none"> • The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component. • The Laboratory Component for the IPCC shall be for CIE only. • However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only. 				

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

Assessment Details (both CIE and SEE)

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

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

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

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

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

Continuous Internal Evaluation (CIE):

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

CIE for the theory component of the IC

Internal Assessment test:

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

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

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

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

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember				30		
Understand	10	10	10	20		
Apply	30	30	30			
Analyse	10	10	10			
Evaluate					50	
Create						

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5	5	5	10	30	20%
CO2	15	15	15	15	30	90	60%
CO3	5	5	5	5	10	30	20%
CO4							
CO5							
CO6							
Total	25	25	25	25	50	150	

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	--	--	--	--	5	10%
CO2	5	5	10	5	10	35	70%
CO3	--	5	--	5	--	10	20%
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
Total	10	10	10	10	10	50	100%

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 $y=ae^{bx}$.	1
1	Fitting of curves of the form $y=ax^b$.	1
1	Correlation coefficient r.	1
1	Regression lines.	1
1	Rank Correlation.	1
2	Introduction on basic probability theory.	1
2	Discrete random variables.	1
2	Continuous random variables.	1
2	Probability mass and density functions.	1
2	Mathematical expectation.	1
2	Mean and variance.	1
2	Binomial distributions.	1
2	Poisson distributions.	1
2	Normal distributions.	1
2	Exponential distributions.	1
3	Introduction to Sampling Theory.	1
3	Sampling distribution.	1
3	Standard error, testing of hypothesis.	1
3	Central limit theorem.	1
3	Levels of significance.	1
3	Test of significance.	1
3	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.	1
4	Problems on two-way ANOVA.	1
4	Latin-square Design.	1
4	Latin-square Design- problems.	1
5	Introduction to Logics.	1
5	Basic connectives and truth tables.	1
5	Logical equivalence-laws of logic.	1
5	Predicates.	1
5	Quantifiers.	1
5	Quantifiers.	1
5	Logical equivalence involving Quantifiers.	1
5	Logical equivalence involving Quantifiers.	1
5	logical implication-rules of inference	1
5	Proofs of theorems.	1
Total		50 Hrs

**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.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	III		
Course Title	:	Computer Networks		
Course Code	:	BIC302		
Course Type (Theory/ Practical/ Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	: 50
Total Hours	:	40 Hours of Theory + 20 Hours of Practical Classes	SEE	: 3 Hours
Credits	:	04	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)**.

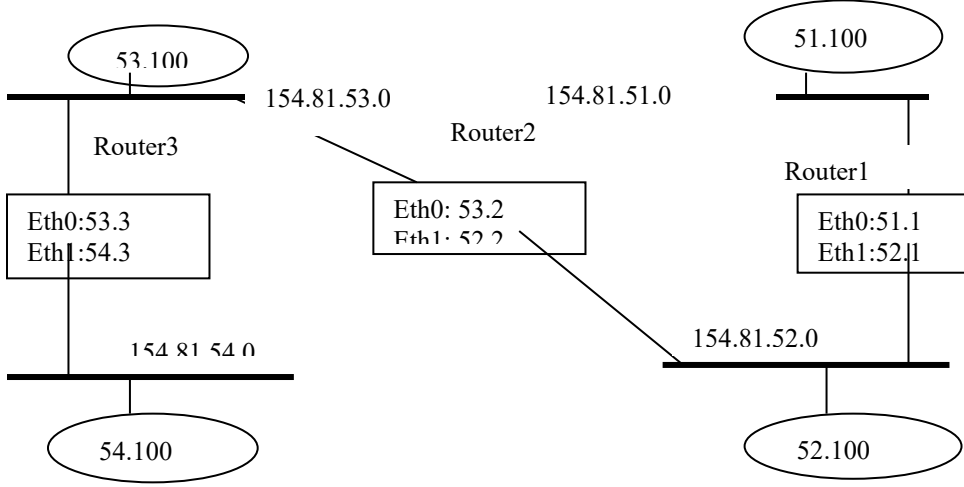


Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
 (Effective from the Academic Year 2024-25)

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	QUIZ	
2	Transport Layer: Introduction, Transport-Layer Protocols, User Datagram Protocol (UDP), Transmission Control Protocol (TCP) Text book 1: Chapter 3	8
Pedagogy	Demonstration of the SOCK program, UDP, FTP and TFTP, TCP	
3	Network Layer: Introduction, Network-Layer Protocols, Unicast Routing, Multicast Routing, Next Generation Ip Text Book 1: Chapter 4	8
Pedagogy	Demonstration of Static Routing, RIP, OSPF, ICMP, Mixed Bridge/Router experiment	
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	Simulation of Configuration of Bridges/Routers, Simple Bridge Experiment, Spanning Tree algorithm	
5	Physical Layer and Transmission Media: Data and Signals, Digital Transmission, Analog Transmission, Bandwidth Utilization, Transmission Media Text book 1: chapter 6	8
Pedagogy	Demonstration of the different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool. Install and configure Network Devices: HUB, Switch and Routers.	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • 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	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.	5
2	Install and Configure Wired NIC and transfer files between systems in LAN and Wireless LAN.	5
3	Install and configure Network Devices: HUB, Switch and Routers.	4
4	Configure a Network topology shown below using packet tracer software 	4
5	Implement the RIP using C Language	3
6	Implement the OSPF using C language	3
7	Implement the ICMP using C language	2
8	Implement the TCP using C language	2
9	Implement the UDP using C language	2
10	Perform the file transfer using FTP	1
11	Perform the remote system Login using rlogin	1
Note : Open Ended Questions to be framed by incharge faculty		

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	L2	UNDERSTAND
CO2	Apply channel allocation, framing, error and flow control techniques.	L3	APPLY
CO3	Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.	L3	APPLY
CO4	Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.	L3	APPLY
CO5	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET	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		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.my-mooc.com/en/video/tcp-ip-model-explained-tcp-ip-model-animation-tcp-ip-protocol-suite-tcp-ip-layers-techterms/
2	https://www.linkedin.com/posts/telecomhall_easily-explained-amazing-animation-of-the-activity-7145485146522132480-kdsT
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

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	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					One Internal Practical Test after	

			Execution	25	50	----	05	4	conduction of all Experiments for 50 Marks	
			Viva-voce	10						
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks	
			Execution	10						
			Viva-voce	05						
	Total CIE Practical							25	10	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100		----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks	
CIE + SEE				100		----	----	40		

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

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

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).

**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.



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

Semester	:	III		
Course Title	:	Data Structure and Algorithms		
Course Code	:	BIC303		
Course Type (Theory/ Practical/ Integrated)	:	Integrated		
Category	:	IPCC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0	SEE	: 50
Total Hours	:	40 Hours of Theory + 20 Hours of practical Classes	SEE Duration	: 3 Hours
Credits	:	04		

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To explain fundamentals of data structures, algorithms and their applications
2	To illustrate representation of Different data structures such as Stack, Queues, Linked Lists, Trees and Graphs
3	To Design and Develop Solutions to problems using linear and non-linear data structures
4	To learn the methods for analysing and evaluating the performance and efficiency of algorithms using asymptotic notations
5	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
6	To use modern tool(s) for program development and recording of results or observations

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 (Strings and Pointers). Stacks: Introduction, Operations, Stacks Using Dynamic Arrays, Evaluation and conversion of Expressions. Queues: Queues, Circular Queues, Multiple Stacks and queues Text Book: T1-Chapter 1,2,3	8
Pedagogy	Think Pair and Share	
2	Linked Lists: Singly Linked Lists and Chains, Different forms of representing Singly Linked List, Polynomials, Doubly Linked List, and Sparse Matrix. Trees: Introduction, Binary Trees, Binary Search Tree and its traversals, Threaded Binary Trees Text Book: T1-Chapter 4, 5	8
Pedagogy	Problem Solving	
3	Introduction to Algorithms: What is an Algorithm? Fundamentals of Algorithmic Problem Solving, Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms and Recursive Algorithms. Brute Force Approaches: Selection Sort and Brute Force String Matching. Decrease and Conquer: Insertion Sort, Topological Sorting Text Book: T1-Chapter 1, T2-Chapter 1, 2, 3, 4	8
Pedagogy	Think Pair and Share	
4	Divide and Conquer: Merge Sort, Quick Sort, Multiplication of Large Integers and Strassen's Matrix Multiplication. The Greedy Method: Prim's Algorithm, Kruskal's Transform and Conquer: Balanced Search Trees, Heaps and Heapsort Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes. Text Book: T2-Chapter 5, 6, 9,	8
Pedagogy	Problem Solving	

5	<p>Dynamic Programming: Three basic examples, The Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. 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), P, NP, and NP-Complete Problems.</p> <p>Text Book: T2-Chapter 8, 10, 12</p>	8
	Case Studies	
	<p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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	<p>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 (An integer), and the third field is the description of the activity for a particular day (A dynamically allocated String).</p>	5
2	<p>Develop a menu driven Program for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX)</p> <p>Push an Element on to Stack</p> <p>Pop an Element from Stack</p> <p>Demonstrate how Stack can be used to check Palindrome</p> <p>Demonstrate Overflow and Underflow situations on Stack</p> <p>Display the status of Stack</p> <p>Exit</p>	5
3	<p>Support the program with appropriate functions for each of the above operations.</p> <p>a. Develop a Program 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 operands.</p> <p>b. Develop a Program to evaluate a given Suffix expression with single digit operands and operators: +, -, *, /, %, ^.</p>	5
4	<p>Develop a menu driven Program for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX)</p>	5

	<p>Insert an Element on to Circular QUEUE</p> <p>Delete an Element from Circular QUEUE</p> <p>Demonstrate Overflow and Underflow situations on Circular QUEUE</p> <p>Display the status of Circular QUEUE</p> <p>Exit</p>	
5	<p>Develop a menu driven Program for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Programme, Sem, PhNo</p> <p>Create a SLL of N Students Data by using front insertion</p> <p>Display the status of SLL and count the number of nodes in it</p> <p>Demonstration of stack / queue</p> <p>Exit</p>	5
6	<p>Develop a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers.</p> <p>Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2</p> <p>Traverse the BST in Inorder, Preorder and Post Order</p> <p>Search the BST for a given element (KEY) and report the appropriate message</p> <p>Exit</p>	5
7	<p>Design and implement program to sort a given set of n integer elements using Quick Sort / Merge 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</p>	5
8	<p>Design and implement program to find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's / Kruskal's algorithm</p>	5
9	<p>Design and implement a program to find shortest paths from a given vertex in a weighted connected graph to other vertices using Dijkstra's algorithm</p>	5
10	<p>a. Design and implement program to find the transitive closure using Warshal's algorithm.</p> <p>b. Design and implement program to solve All-Pairs Shortest Paths problem using Floyd's algorithm.</p>	5
11	<p>Design and implement program to solve 0/1 Knapsack problem using Dynamic Programming method</p>	5
12	<p>Design and implement program for N Queen's problem using Backtracking</p>	5
<p>Note : Open Ended Questions to be framed by incharge faculty</p>		

CO4		3											3	
CO5			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	Design and Analysis of Algorithms: https://nptel.ac.in/courses/106/101/106101060/
4	Virtual Labs (CSE): http://cse01-iiith.vlabs.ac.in/

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	
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

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					
Understand	20	20	20	20	
Apply	20	20	30	30	50
Analyse	10	10			
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 -3	Module-4	Module-5		
CO1	5	5				10	10%
CO2	15	15	5	5		40	40%
CO3			15	10	5	40	40%
CO4				5	15	20	20%
CO5							
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).

Marks update and text book

**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	:	III			
Course Title	:	Operating Systems			
Course Code	:	BIC304			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Category	:	PCC			
Stream	:	CSE-ICB	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	:	50
Total Hours	:	40 Hours of Theory	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	<p>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.</p> <p>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.</p> <p>Text Book 1: Chapter – 1</p>	8 Hours
Pedagogy	Think Pair and Share	
2	<p>Process Management: Process concept, Process scheduling, Operations on processes, Inter process communication.</p> <p>Multi-threaded Programming: Overview, Multithreading models, Thread Libraries, Threading issues.</p> <p>Process Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Thread scheduling, Multiple-processor scheduling</p> <p>Text Book 1: Chapter – 3</p>	8 Hours
Pedagogy	Problem Solving	
3	<p>Process Synchronization: Synchronization, The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classical problems of synchronization.</p> <p>Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock</p> <p>Text Book : Chapter – 6</p>	8 Hours
Pedagogy	Think Pair and Share	

4	<p>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-Write, Page replacement policy – LRU (in comparison with FIFO & Optimal), Thrashing, design alternatives – inverted page tables, bigger pages. Case Study: Linux/Windows Memory.</p> <p>Text Book 1: Chapter -8</p>	8 Hours
Pedagogy	Think Pair and Share	
5	<p>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.</p> <p>Text Book 1: Chapter – 10</p>	8 Hours
Pedagogy	Case Studies	
	<p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 Dhamdhare, 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
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/vBURTi97EkA
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
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 to2.5	Module 2.5to 3	Module-4	Module-5		
CO1	5	5					10	10%
CO2	10	10	5				25	25%
CO3	5	5	5				15	15%
CO4				5	5	5	15	15%
CO5				5	10	10	25	25%
CO6					5	5	10	10%
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	25
Apply	50
Analyse	25
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	10%
CO2	10	10	5			25	25%
CO3	5	5	15			25	25%
CO4				10	10	20	20%
CO5				10	10	20	20%
Total	20	20	20	20	20	100	100%

**PROFESSIONAL CORE
COURSE (PCC)**

PCC Course - Professional Core Course

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	III		
Course Title	:	Digital Design and Computer Organization		
Course Code	:	BIC305		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	PCC		
Stream	:	CSE-ICB	CIE	: 50Marks
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	: 50Marks
Total Hours	:	40 Hours of theory	SEE	: 03 Hours
Credits	:	03	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.	8

	Text book 2: 7.1, 7.2, 8.1	
Pedagogy	Chalk and talk/ Think and pair//PowerPoint Presentation/Videos	
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • 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	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 devices.	Apply	L4
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
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-l
5	https://www.youtube.com/watch?v=lw1STgKUpW0

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

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

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

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				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					
Understand	20	20	20	20	
Apply	30	30	30	30	
Analyse					
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-3	Module-4	Module-5		
CO1	5	5				10	10%
CO2	15	15	5	5		40	40%
CO3			15	10	5	30	30%
CO4				5	15	20	20%
CO5							
Total	20	20	20	20	20	100	100%

**PROJECT BASED
LEARNING (PBL)**

PBL- Project Based Learning

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

	CIE		SEE	
	Project Weekly Assessment		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.

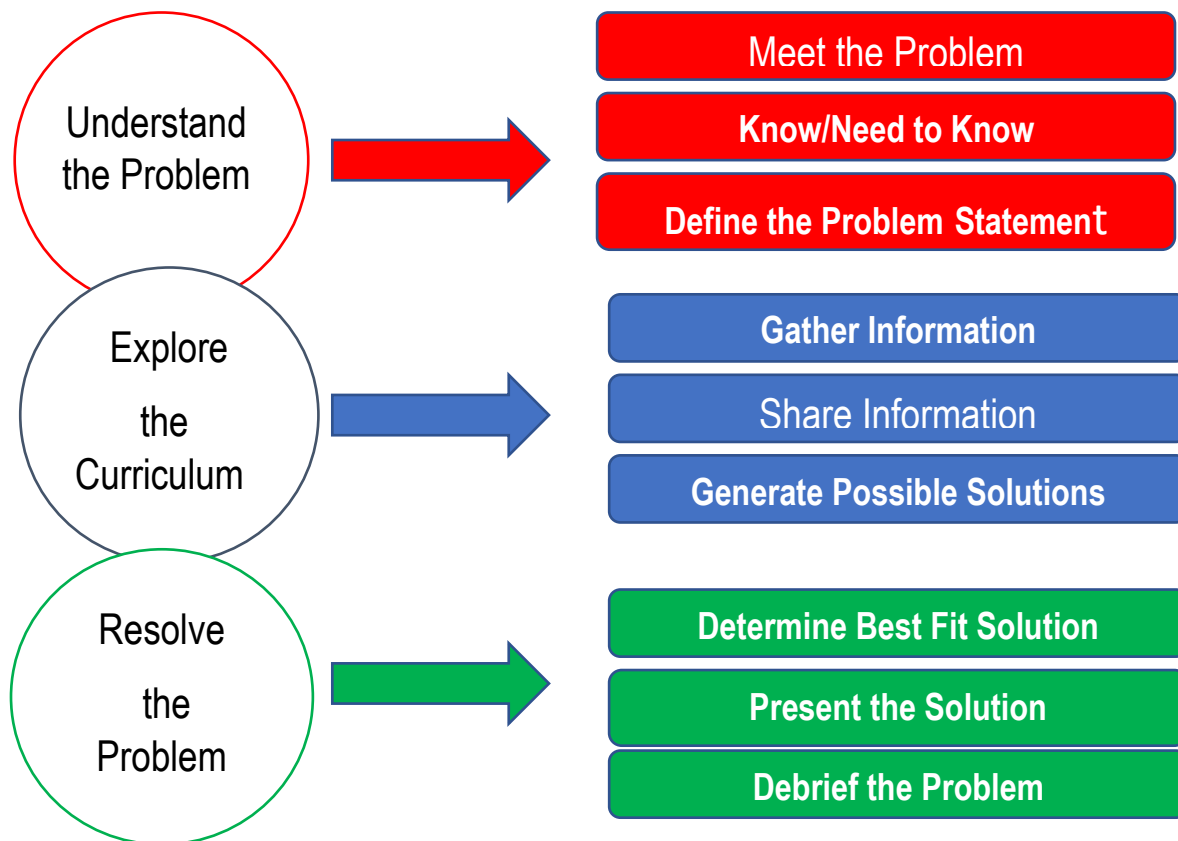
Phase 2:

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.

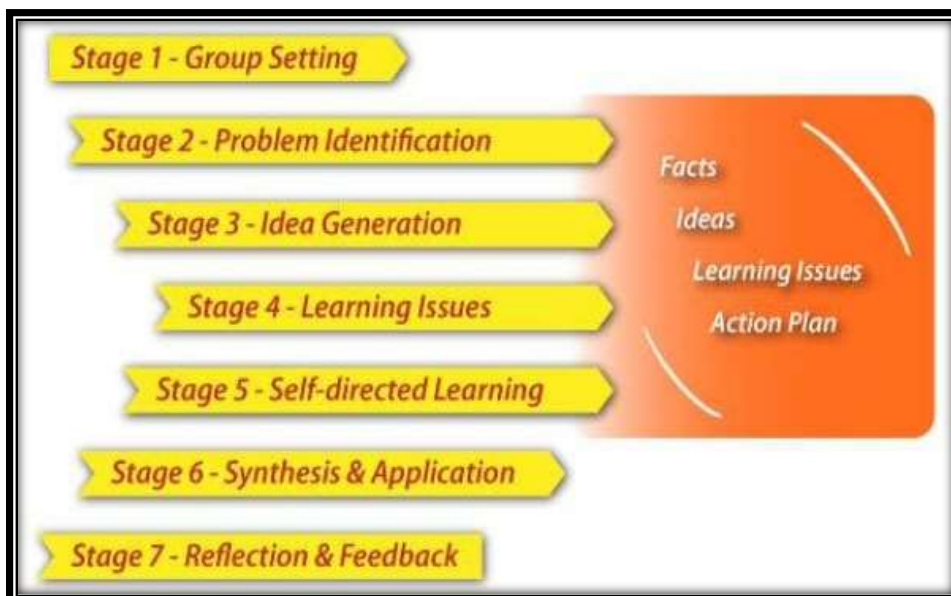
10. Obstacles/Gaps

- 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

- i. Cover Page
- ii. Certificate
- iii. Declaration
- iv. Acknowledgement
- v. Table of Contents
- vi. List of Tables
- vii. List of Figures
- viii. Introduction
- ix. Background / Literature Review
- x. Methodology / Solution
- xi. Analysis and Design
- xii. Implementation
- xiii. Results
- xiv. Conclusion and Future Works
- xv. Bibliography / References
- xvi. 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	<ul style="list-style-type: none"> ▪ 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 	<ul style="list-style-type: none"> ▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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 	<ul style="list-style-type: none"> ▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Information supports the solution to the challenge or question. 	<ul style="list-style-type: none"> ▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	<ul style="list-style-type: none"> ▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources 	<ul style="list-style-type: none"> ▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently 	<ul style="list-style-type: none"> ▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention.

2	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ More than 5 spelling, grammatical, or punctuation errors▪ Poor use of vocabulary and word choice	<ul style="list-style-type: none">▪ Content is unfocused and haphazard.▪ Information does not support the solution to the challenge or question.▪ Information has no apparent pattern.	<ul style="list-style-type: none">▪ 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	III
Subject Identified for PBL	Web Technologies
Prerequisite	There is no prerequisite to start learning web development. Web Development includes: Front-End Development and Back-End Development.
Justification for the selected subject	There is an ever-increasing demand for the web developers.
List of possible projects	

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	III		
Course Title	:	Web Technologies		
Course Code	:	BIC306		
Course Type (Theory/ Practical/ Integrated)	:	Project Based Learning		
Category	:	PBL		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:0:0:2	SEE	: 50
Total Hours	:	25Hours of Theory +Project	SEE	: 3 Hours
Credits	:	02	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	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)**.



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

Sl. No.	Projects Details	COs
1	Course Registration System	CO1-CO4
2	Career Counseling Platform	CO1-CO4
3	Discussion Forum or Learning Management System (LMS)	CO1-CO4
4	School Event Calendar	CO1-CO4
5	Student Information System	CO1-CO4
6	Attendance Tracker	CO1-CO4
7	Library Management System	CO1-CO4
8	Gradebook Application	CO1-CO4
9	Basic Social Network	CO1-CO4
10	Event Sharing and RSVP Platform	CO1-CO4
11	Social Bookmarking Tool	CO1-CO4
12	Pet Adoption Network	CO1-CO4
13	Charity or Fundraising Platform	CO1-CO4
14	Movie Catalog Application	CO1-CO4
15	Movie Recommendation System	CO1-CO4
16	Movie Review Blog	CO1-CO4
17	Movie Character Database	CO1-CO4
18	Sports News Aggregator	CO1-CO4
19	Sports League Standings Tracker	CO1-CO4
20	Sports Event Management System	CO1-CO4
21	Sports Equipment Marketplace	CO1-CO4
22	Fitness Tracking App	CO1-CO4
23	Sports Social Network	CO1-CO4
24	Election Result Tracker	CO1-CO4
25	Political Opinion Polling Platform	CO1-CO4

	<p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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	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.	L3	Apply
CO2	Design dynamic web pages using JavaScript as client-side scripting for data processing.	L3	Apply
CO3	Design dynamic web pages using PHP as server-side script for back-end data processing including database access.	L3	Apply
CO4	Design a web application using mark-up languages and PHP for client side and server-side scripts.	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	
CO3	3				3								3	
CO4	3	3	3	3	3				3	3	3		3	

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 for Web Applications Lab (Project Based Learning (PBL)):

This Course refers to project based learning. Credit for this course can be 01 and its Teaching Learning hours (L : T : P : S) can be considered as (0 : 0 : 2 : 0).

Students can create their own individual applications. Each student works independently on their project. These applications should be complete and functional as standalone programs. Students can add extra features to their applications to enhance their functionality, showcasing their creativity and skills.

Projects 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

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



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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



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

Semester	:	III			
Course Title	:	Basic Linux for Hackers			
Course Code	:	BIC307			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	AEC			
Stream	:	CS-ICB	CIE	:	50
Teaching hours/ week (L:T:P:S)	:	0:0:2:0	SEE	:	
Total Hours	:	20	SEE	:	2 Hours
Credits	:	01	Duration	:	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Gain a comprehensive understanding of the Linux operating system, including its architecture, file system structure, and basic commands.
2	Develop proficiency in using the Linux command line interface (CLI) for navigation, file management, and system administration tasks.
3	Understand basic security concepts and how to implement security measures such as user permissions, encryption, and access control lists.
4	Acquire skills in shell scripting using Bash to automate tasks, streamline workflows, and perform basic penetration testing tasks.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



DSATM

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

Module No.	Topics	Hours
1	Getting started with Basics: A tour of Kali, Basic commands in Linux, Finding Stuff, Modifying Files and Directories. Text Manipulation: Viewing Files, Filtering Text with grep, using sed to find and replace, Viewing files with more and less.	4 Hours
Pedagogy	Hands-on Exercise	
2	Analyzing and Managing Networks: Analyzing networks with ifconfig, Checking wireless network devices with ifconfig, changing your network information, Manipulating the DNS. Adding and Removing Software: Using apt to handle software, Adding repositories to your sources. list file, Using a GUI-based installer.	4 Hours
Pedagogy	Hands-on Exercise	
3	Controlling File and Directory Permissions: Different types of users, Granting permissions, Checking and changing permissions, Setting more secure default permissions with masks, Special permissions. Managing User Environment Variables: Viewing and modifying environment variables, Changing your shell prompt, Changing your PATH, Creating a user-defined variable.	4 Hours
Pedagogy	Hands-on Exercise	
4	Bash Scripting: A crash course in Bash, Your first script, Your very first hacker script, Common built-in bash commands. File system and Storage Device Management: The Device directory / dev, Mounting and Unmounting, Monitoring filesystems.	4Hours
Pedagogy	Hands-on Exercise	
5	The Logging System: The syslog logging daemon, automatically cleaning up logs and log rotate, Remaining Stealthy. Using and Abusing Services: Starting, stopping and restarting services, Creating an HTTP web server with Apache web server, OpenSSH and the Raspberry Spy Pi, Extracting information from MySQL / MariaDB	4 Hours
Pedagogy	Hands-on Exercise	

CIE for Principles of Programming Using C (Integrated Professional Core Course (IPCC)):

This Course refers to professional theory core course integrated with practical. Credit for this course can be 03 and its Teaching Learning hours (L: T: P: S) can be considered as (2: 0: 2: 0).

15 marks for the conduction of practical experiment and preparation of the Laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.

On completion of every program in the laboratory, the student shall be evaluated including viva-voce and marks shall be awarded on the same day.

Each program report can be evaluated for **15 marks** (Write-up – 3 marks, Execution – 8 marks .and Viva – 4 marks)

The Laboratory test (duration 2 hours / 3 hours) after completion of all the programs shall be conducted for 50 marks and scaled down to **10 marks**.

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. This course is common to all branches of first year B.E/B.Tech. 2023-24 regulation.

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

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Linux Basics For Hackers, Getting Started With Networking, Scripting, and Security in Kali, William Pollock, 2019, ISBN-10: 1-59327-855-1 ISBN-13: 978-1-59327-855-7.
2	https://github.com/yeahhub/Hacking-Security-Ebooks/blob/master/README.md

Reference Books

1	https://dokumen.pub/getting-started-becoming-a-master-hacker-hacking-is-the-most-important-skill-set-of-the-21st-century.html
2	https://archive.org/details/network-basics-for-hackers

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understanding of the Linux operating system, including its file system, shell basics, and essential commands.	L2	Understand
CO2	Demonstrate by executing commands efficiently and understanding their output.	L3	Apply
CO3	Work on concepts on Linux, including configuration, troubleshooting, and basic network security principles.	L3	Apply
CO4	Engagement in hands-on labs and projects to reinforce theoretical concepts and develop practical skills.	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			3								3		

Weblinks and Video Lectures (e-Resources)

1	https://books.google.co.in/books?id=HkFYswEACAAJ&printsec=copyright&redir_esc=y#v=onepage&q&f=false
2	https://www.oreilly.com/library/view/linux-basics-for/9781492069485/xhtml/bcover.xhtml
3	https://www.reddit.com/r/linuxquestions/comments/aa9v1l/linux_basics_for_hackers_book/?rdt=44756

Computer Science & Engineering

3 Credits & 2 Credits Courses – Theory (if Integrated)

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	50	$(50+50+50) / 3$	15	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	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		50				
	Total CIE Theory						25	10

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	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	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	10	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	----	5	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		Total CIE Practical						25	10

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

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 40% of the maximum Marks (20 Marks out of 50).

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

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

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

Continuous Internal Evaluation (CIE):

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

**CIE for the theory component of the IC
Internal Assessment test:**

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

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

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction (Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

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

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	
Remember						
Understand	20	20	20	20	20	
Apply	30	30	30	30	30	
Analyse						
Evaluate						
Create						

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	15	15				30	20%
CO2	10	10	10	10		40	26.66%
CO3			15	15	20	50	33.33%
CO4					30	30	20%
CO5							
Total	25	25	25	25	50	150	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	15	15				30	20%
CO2	10	10	10	10		40	26.66%
CO3			15	15	20	50	33.33%
CO4					30	30	20%
CO5							
Total	25	25	25	25	50	150	100%

4 Credit Course – IPCC

The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (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 IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IPCC

Internal Assessment Test (IAT):

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

Three Tests each of **50 Marks**

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

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

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

- The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

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

CIE for the practical component of the 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 **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
- 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 shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

3 Credit Course – Theory

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

Assessment Details (both CIE and SEE)

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

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

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

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

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

Continuous Internal Evaluation (CIE):

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

CIE for the theory component of the IC

Internal Assessment test:

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

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

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

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

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

- The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

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

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

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

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

1 Credit Course – Theory

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:

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideations

The faculty may 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 internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

Internal Assessment test:

The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels.

Three Tests (MCQ) each of **50 Marks**

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 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 to be conducted after 4th week
- CCA2 to be conducted after 9th week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

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

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject .
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English. **The duration of SEE is 01 hours.**
- The question paper will have 50 MCQs **covering all modules**. The questions shall map with the course outcome, program outcome and Blooms RBT level.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	4 th			
Course Title	:	Number Theory			
Course Code	:	BMATB401			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	CS-ICB	CIE	:	50 Marks
Teaching hour/week (L:T:P:S)	:	2:2:0:0	SEE	:	50 Marks
Total Hours	:	50 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 congruence, random numbers, primitive roots, Pythagorean triangle and partitions in solving problems
3	Analyze problems using concepts of congruence, random numbers, primitive roots, Pythagorean triangle and partitions in solving problems
4	Analysis of various real time problems using the skills acquired

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)

DSATM

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	MODULE – I: Divisibility, basic definitions and properties, Arithmetical functions: Examples, properties and their rate of growth, congruence, linear congruence and basic properties of congruence, linear Diophantine equation, Chinese remainder theorem.	8
Pedagogy	Chalk and board, group discussion, ppt, video	
2	MODULE-II: Fermat's theorem, Wilson's theorem, Euler's Phi-function/ Euler's Totient function and Euler's theorem (Statement of the theorems only), RSA Algorithm in cryptography. Random Numbers: Introduction, Properties and application, generation of pseudo random numbers, test of randomness by Kolmogorav Smirnov test	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
3	MODULE-III: Primitive roots and Indices: Order of an integer modulo n , Primitive roots for primes, Euler's Criterion (without proof), Quadratic reciprocity law and properties: The legendre symbol (Problems on properties), Gauss lemma, Jacobi symbol and problems, The theory of Indices, Quadratic congruences with composite moduli.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
4	MODULE-IV Numbers of special form: Perfect numbers; Mersenne Primes and Amicable numbers; Fermat's numbers; Fibonacci numbers, Pythagorean triple, Finite continued fractions.	8
Pedagogy	Chalk and board, group discussion, ppt, videos	
5	MODULE-V: Partitions: Basic properties, Representation of integers as sums of squares: sums of two squares, sums of more than two squares, Elliptic curves: rational points on curves- Unit Circle, Elliptic curves modulo 'p' prime.	8

Pedagogy	Chalk and board, group discussion, ppt, videos
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List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	David M. Burton, "Elementary Number Theory", Mc.Graw-Hill, 7th edition, 2007.
2	Averill. M Law, "Simulation Modelling & Analysis", Mc.Graw Hill, 5th edition, 2013.
3	I.Niven, "An Introduction to the Theory of Numbers", John Wiley & Sons.5 th edition, 2012
4	NealKoblitz, "A Course in Number Theory and Cryptography", Springer-Verlag, 2nd edition, 1994.

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 Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves.	Remember, Understand	L1, L2
CO2	Apply techniques of Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using Arithmetical functions, congruence quadratic reciprocity, random number generations, partitions and elliptic curves.	Analyse	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	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	--	--	1	2	1	1	--	--	1	1	--	--	--	--

Weblinks and Video Lectures (e-Resources)	
1	http://nptel.ac.in/courses.php?disciplineID=111
2	http://www.class-central.com/subject/math(MOOCs)
3	http://academicearth.org/
4	VTU e-Shikshana Program
5	VTU EDUSAT Program

Assessment Pattern (both CIE and SEE)

Applied Science Courses								
4 credits - Theory								
Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50			20	
CIE	Theory	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	25	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
Total CIE Theory						50	20	Scale down Marks of IAT and CCA to 50

SEE		Theory exam	Entire theory syllabus including questions from lab component	100	---	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	
				<ul style="list-style-type: none"> • The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component. • The Laboratory Component for the IPCC shall be for CIE only. • However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only. 				

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

Assessment Details (both CIE and SEE)

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

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

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

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

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

Continuous Internal Evaluation (CIE):

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

CIE for the theory component of the IC

Internal Assessment test:

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

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

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

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

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

Total score for CCA is **10 Marks**

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

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

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

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember				30		
Understand	10	10	10	20		
Apply	30	30	30			
Analyse	10	10	10			
Evaluate					50	
Create						

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5	5	5	10	30	20%
CO2	15	15	15	15	30	90	60%
CO3	5	5	5	5	10	30	20%
CO4							
CO5							
CO6							
Total	25	25	25	25	50	150	

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	--	--	--	--	5	10%
CO2	5	5	10	5	10	35	70%
CO3	--	5	--	5	--	10	20%
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
Total	10	10	10	10	10	50	100%

Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Divisibility, basic definitions and properties	1
1	Arithmetical functions: Example with some properties	1
1	Rate of growth.	1
1	Problems on above topic	1
1	The greatest common divisor, congruences –Problems.	1
1	Linear congruence and basic properties of congruence, and problems on it.	1
1	Linear Diophantine equation.	1
1	Chinese remainder theorem.	1
2	Fermat's theorem	1
2	Wilson's theorem	1
2	Euler's Phi-function/ Euler's Totient function and Euler's theorem (Statement of the theorems only)	1
2	Problems on above topic	1
2	RSA Algorithm in cryptography	1
2	Problems on above topic	1
2	Random Numbers: Introduction, Properties and application, generation of pseudo random numbers,	1
2	test of randomness by Kolmogorav Smirnov test.	1
3	Order of an integer modulo n	1
3	Primitive roots for primes	1
3	Quadratic congruence, Quadratic residue and non residue	1
3	Quadratic reciprocity law and properties: Euler's Criterion(statement only.)	1
3	The legendre symbol(Problems on properties), Gauss lemma	1
3	Jacobi symbol and problems	1
3	The theory of Indices	1
3	Quadratic congruences with composite moduli.	1

4	Numbers of special form: Perfect numbers	1
4	Mersenne Primes	1
4	Amicable numbers	1
4	Fibonacci numbers	1
4	Fermat's numbers	1
4	Pythagorean triple	1
4	Finite continued fractions	1
4	Problems on above topic	1
5	Partitions: Basic properties	1
5	Problems on above topic	1
5	Representation of integers as sums of squares	1
5	Sums of two squares	1
5	Sums of more than two squares	1
5	Rational points on curves- Unit Circle	1
5	Elliptic curves: $P+Q$, $2P$	1
5	Elliptic curves modulo 'p' prime	1
	Total	40 Hrs

**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.



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	IV			
Course Title	:	Network Defense			
Course Code	:	BIC402			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSE-ICB		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40 Hours of Theory+20Hours of Practical Classes		SEE	: 3 Hours
Credits	:	4		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Work on most common dangers to networks including session hacking, virus attacks, Trojan horses, denial of service, and buffer overflow.
2	Describe how firewalls work and the requirements of single machine, small office, network, and enterprise firewalls.
3	Describe how intrusion-detection systems work in prevention, detection and the need of encryption
4	Demonstrate VPN solutions and OS hardening
5	Write the security policies and assessing system security

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 Network Security, Types of Attacks. Text Book1: Chapter 1,2	8 Hours
Pedagogy	Quiz	
2	Fundamentals of Firewalls, Firewall Practical Applications Text Book1: Chapter 3,4	8 Hours
Pedagogy	Demonstration	
3	Intrusion-Detection Systems, Encryption Fundamental Text Book1: Chapter 5,6	8 Hours
Pedagogy	Demonstration	
4	Virtual Private Networks, Operating System Hardening Text Book1: Chapter 7,8	8 Hours
Pedagogy	Demonstration	
5	Security Policies, Assessing System Security Text Book1: Chapter 11,12	8 Hours
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none">• 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	SQL injection attack -- is the most common vulnerability found in websites. It enables an attacker to gain unauthorized access to the database or retrieve database information directly.	1
2	Cross-site scripting ("XSS" or "CSS") attacks -- exploit vulnerabilities in dynamically generated web pages. This enables malicious attackers to inject client-side script into web pages viewed by other users.	1
3	A network scanning attack -- helps attackers organize an attack on the targeted network.	1
4	A brute-force attack is when an attacker -- attack helps attackers organize an attack on the targeted network.	2
5	Auditing Docker Host Security Using Docker-Bench-Security Tool	2
6	Application Vulnerability Scanning using OWASP ZAP - is a penetration testing tool that allows testing of web applications. ZAP provides automated scanners as well as a set of tools that help detect security vulnerabilities manually. I	3
7	Analyzing Web Application Attack Surface Using OWASP Attack Surface Detector (ZAP Plugin)I -- Attack Surface Detector performs code analysis statically and helps identify the application attack surface.	3
8	Configuring, Viewing, and Analyzing Windows Event Logs -- Windows OS tracks various events, activities, and functions through logs.	4
9	Configuring, Viewing, and nalyzing IIS Logs -- IIS tracks various events, activities, and functions through logs. Defend Web Server by configuring, viewing and analyzing IIS logs.	4
10	Configuring, Viewing, and Analyzing Logs in a Centralized Location Using Splunk - Splunk is a tool for collecting, monitoring, and analyzing log files from servers, applications, or other sources.	5
11	Identifying Suspicious Activities Using Log Monitoring and Analysis--Proactive log monitoring and analysis provides enhanced breach detection and incident response.	5
Note : Open ended question to be framed by Faculty incharge		

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Network Defense and Countermeasures Principles and Practices Third Edition Chuck Easttom

Reference Books

1	Guide to Network Defense and Countermeasures by Dawn Weaver (Author), Dean Farwood (Author), Randy Weaver (Author)
2	Network Defense by Randy Weaver, Thomson Press (India) Ltd

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Identify the most common dangers to networks including session hacking, virus attacks,	L3	L3
CO2	Explain how firewalls work and the requirements of single machine, small office, network, and enterprise firewalls.	L3	L3
CO3	Explain how intrusion-detection systems work in prevention, detection and the need of encryption	L3	L3
CO4	Evaluate VPN solutions and OS hardening	L4	L4
CO5	Creating the security policies and assessing system security	L5	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	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		3								3	3

Weblinks and Video Lectures (e-Resources)

1	https://skillsforall.com/course/network-defense?courseLang=en-US
2	
3	
4	

4 Credits Courses – Integrated Professional Core Course (IPCC)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details	
Total CIE Theory + Practical				50	----	----	20		
CIE	Theory	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	15	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks	
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50					
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	10	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted	
		CCA-2- Pedagogical Initiatives/ Activity based learning		50					
	Total CIE Theory						25	10	Scale down Marks of IAT and CCA to 25
CIE	Practical	Conduction of Experiments	Performance Continuous Evaluation of each experiment Record Observation book	05 05 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)

		Practical Test	Write up	15	50	----	05	4	One Internal Practical Test after conduction of all Experiments for 50 Marks	
			Execution	25						
			Viva-voce	10						
		Open Ended Experiment	Write up	05	20	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks	
			Execution	10						
			Viva-voce	05						
	Total CIE Practical						25	10	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment	
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks		
CIE + SEE				100	----	----	40			

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

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

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					
Understand	5	5	5		
Apply	15	15	15		
Analyse	20	20	20	50	50
Evaluate	10	10	10		
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							100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	5
Apply	30-40
Analyse	30-40
Evaluate	10-20
Create	5

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 2 to 3	Module-4	Module-5		
CO1	20					20	20
CO2		20				20	20
CO3			10			20	20
CO4				20		20	20
CO5					20	20	20
Total						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).

**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.



Dayananda Sagar Academy of Technology & Management

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Semester	:	IV			
Course Title	:	Object Oriented Programming with JAVA			
Course Code	:	BIC403			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	IPCC			
Stream	:	CSE-ICB		CIE	: 50
Teaching hours/ week (L:T:P:S)	:	3:0:2:0		SEE	: 50
Total Hours	:	40 Hours of Theory+ 20 Hours of Practical Classes		SEE	: 3 Hours
Credits	:	04		Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn fundamental features of object oriented language and JAVA
2	Set up Java JDK environment to create, debug and run simple Java programs.
3	Learn object oriented concepts using programming examples.
4	Study the concepts of importing of packages and exception handling mechanism.

Teaching-Learning Process

Pedagogical Initiatives:

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

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



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COURSE CURRICULUM

Module No.	Topics	Hours
1	An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings. Text book 1: Ch 2, Ch 3	8 Hours
Pedagogy	Think Pair and Share	
2	Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements. Text book 1: Ch 4, Ch 5	8 Hours
Pedagogy	Problem Solving	
3	Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited Text book 1: Ch 6, Ch 7 (7.1-7.9)	8 Hours
Pedagogy	Think Pair and Share	
4	Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. Text book 1: Ch 8.	8 Hours
Pedagogy	Problem Solving	
5	Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions. Text book 1: Ch 9, Ch 10	8 Hours

	Case Studies
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • Think Pair and Share (Blended Learning): provides an opportunity for students to learn from one another • Problem Solving: encourages cognitive thinking and enables creative problem solving • Poster Presentation: allows students to represent the concepts visually in order to understand the topics easily. • Case studies: maps different domains in real time applications • Demonstration: exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.	5
2	Write a JAVA program for multiplication of two arrays.	5
3	Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>	5
4	Write a JAVA program to sort list of elements in ascending and descending order	5
5	. Create a JAVA class called Student with the following details as variables within it. USN NAME BRANCH PHONE PERCENTAGE Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.	5
6	Write a JAVA program demonstrating Method overloading and Constructor overloading.	5
7	Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.	5
8	. Demonstrate dynamic dispatch using abstract class in JAVA.	5
9	Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of access modifiers (private, public, protected, default) in all these classes using JAVA	5
10	Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundsException.	5

Note : Open ended questions to be farmed by faculty incharge

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
2	Introduction to the Design and Analysis of Algorithms, By Anany Levitin, 3rd Edition (Indian), 2017, Pearson
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	Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
4	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.

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 the knowledge to solve Arrays, Stacks, Queue, Linked List, and Tree data structures related problems	L3	Apply
CO3	Apply various problem solving methodologies such as brute force, divide and conquer, greedy, decrease and conquer, dynamic programming and	L3	Apply
CO4	Analyze the efficiency of algorithm design approaches in a problem specific manner in terms of space and time complexity.	L4	Analyze
CO5	Develop solutions to problems by experimenting the various Algorithm techniques using relevant Data Structures.	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	
CO2	3												3	
CO3	3												3	
CO4		3											3	
CO5			3	3	3								3	

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=elrMbAQSU34
2	https://www.youtube.com/watch?v=A1uqgEz3hB0
3	https://onlinecourses.nptel.ac.in/noc24_cs43/preview

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

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	10	10	10	10	
Apply	10	10			
Analyse	20	20			50
Evaluate	5	5	40	40	
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	5
Understand	15
Apply	40
Analyse	40
Evaluate	
Create	

SEE Course Plan

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	IV		
Course Title	:	Database management system		
Course Code	:	BIC404		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	PCC		
Stream	:	CSE-ICB	CIE	: 50Marks
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	: 50Marks
Total Hours	:	40	SEE	: 03 Hours
Credits	:	3	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.
6	To become familiar with database storage structures and access techniques.

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	<p>Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications.</p> <p>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.</p> <p>Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams, Specialization and Generalization.</p> <p>Textbook 1: Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10 RBT: L1, L2, L3</p>	8
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
2	<p>Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.</p> <p>Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra.</p> <p>Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping.</p> <p>Textbook 1: Ch 5.1 to 5.3, Ch 8.1 to 8.5; Ch 9.1 to 9.2 Textbook 2: 3.5 RBT: L1, L2, L3</p>	8
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
3	<p>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.</p>	8

	<p>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</p> <p>Textbook 1: Ch 14.1 to 14.7, Ch 6.1 to 6.5</p> <p>RBT: L1, L2, L3</p>	
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
4	<p>SQL: Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL.</p> <p>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.</p> <p>Textbook 1: Ch 7.1 to 7.3, Ch 20.1 to 20.6</p> <p>RBT: L1, L2, L3</p>	8
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
5	<p>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.</p> <p>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</p> <p>Textbook 1:Chapter 21.1 to 21.5, Chapter 24.1 to 24.6</p> <p>RBT: L1, L2, L3</p>	8
Pedagogy	Chalk and talk/ Problem-based learning/PowerPoint Presentation/Videos	
	<p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 	

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

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	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					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5				10	10%
CO2	15	15	5	5		40	40%
CO3			15	10	5	30	30%
CO4				5	15	20	20%
CO5							
Total	20	20	20	20	20	100	100%

**PROFESSIONAL CORE
COURSE (PCC)**

PCC Course - Professional Core Course

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	IV		
Course Title	:	Internet of things		
Course Code	:	BIC405		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	PCC		
Stream	:	CSE-ICB	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	3:0:0:0	SEE	: 50 Marks
Total Hours	:	40	SEE	: 3 Hours
Credits	:	03	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To study the fundamentals about IoT
2	To study about IoT Access technologies
3	To study the design methodology and different IoT hardware platforms
4	To study the basics of IoT Data Analytics and supporting services.
5	To study about various IoT case studies and industrial 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

Module No.	Topics	Hours
1	<p>Internet of Things an Overview: Internet of Things, IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT, M2M Communication, Examples of IoT</p> <p>Design Principles for Connected Devices: Design Principles for Connected Devices, Introduction, IoT/M2M Systems Layers and Designs Standardization, Communication Technologies, Data Enrichment, Data Consolidation and Device Management at Gateway, Ease of Designing and Affordability. Text Book 1: Chapter 1, 2</p>	8 Hours
Pedagogy	Quiz	
2	<p>Design Principles for Web Connectivity: Introduction, Web Communication Protocols for Connected Devices, Message Communication Protocols for Connected Devices, Web Connectivity for Connected Devices Network using Gateway, SOAP, REST, HTTP RESTful and WebSockets.</p> <p>Internet Connectivity Principles: Introduction, Internet Connectivity, Internet-Based Communication, IP Addressing in the IoT, Media Access Control, Application Layer Protocols, HTTP HTTPS, FIT Telnet and Others. Text Book 1: Chapter 3, 4</p>	8 Hours
Pedagogy	Quiz	
3	<p>Sensors, Participatory Sensing, RFIDs, and Wireless Sensor Networks: Introduction, Sensor Technology, Participatory Sensing, Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, Radio Frequency Identification Technology, Wireless Sensor Networks Technology.</p> <p>Prototyping the Embedded Devices for IoT and M2M: Introduction, Embedded Computing Basics, Embedded Platforms for Prototyping Things Always Connected to the Internet/Cloud.</p> <p>Prototyping and Designing the Software for IoT Applications: Introduction, Prototyping embedded device software, Devices gateways, Internet and web/cloud service software development, Prototyping online components APIs and Web APIs. Text Book1: Chapter 7,8,9</p>	8 Hours
Pedagogy	Demonstration	

4	<p>Data Acquiring, Organizing, Processing and Analytics: Introduction, Data Acquiring and Storage, Organizing the Data, Transactions, Business Processes, Integration and Enterprise Systems, Analytics, Knowledge Acquiring, Managing and Storing Processes</p> <p>Business Models and Processes Using IoT: Introduction, Business Models and Business Model Innovation, Value Creation in the Internet of Things, Business Model Scenarios for Internet of Things.</p> <p>Text Book 1: Chapter 5,11</p>	8 Hours
Pedagogy	Demonstration	
5	<p>CASE STUDIES/INDUSTRIAL APPLICATIONS: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment's, Industry 4.0 concepts.</p> <p>Text Book2: chapter 2</p>	8 Hours
	Case Studies	

Text Books	
Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	INTERNET OF THINGS Architecture and Design Principles by Raj Kamal, McGraw Hill Education (India) Private Limited
2	Internet of Things – A hands-on approach, Arshdeep Bhaga, Vijay Madiseti, Universities Press, 2015
Reference Books	
1	Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill Higher Education
2	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the basics of IoT.	L2	
CO2	Illustrate the Web Connectivity, Internet connectivity principles	L3	
CO3	Design methodology for hardware platforms involved in IoT	L4	
CO4	Analyze the data organization and Business management	L4	
CO5	Compare IOT Applications in Industrial & real-world.	L4	

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)

1	https://www.youtube.com/watch?v=1KVrBjSqS5s
2	https://www.youtube.com/watch?v=NAcTzfMSxA8
3	https://www.youtube.com/watch?v=v3d1ZhlmuSE
4	https://www.youtube.com/watch?v=Akptldq2lc

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 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	Considering all the Modules	50	(50+50) / 2	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives / Activity Based learning		50				
Total CIE Theory						50	20	Total Marks of IAT and CCA is 50
SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

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

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	05
Understand	20
Apply	30
Analyse	30
Evaluate	15
Create	

SEE Course Plan

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

**PROJECT BASED
LEARNING (PBL)**

PBL- Project Based Learning

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

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

1. Introduction

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

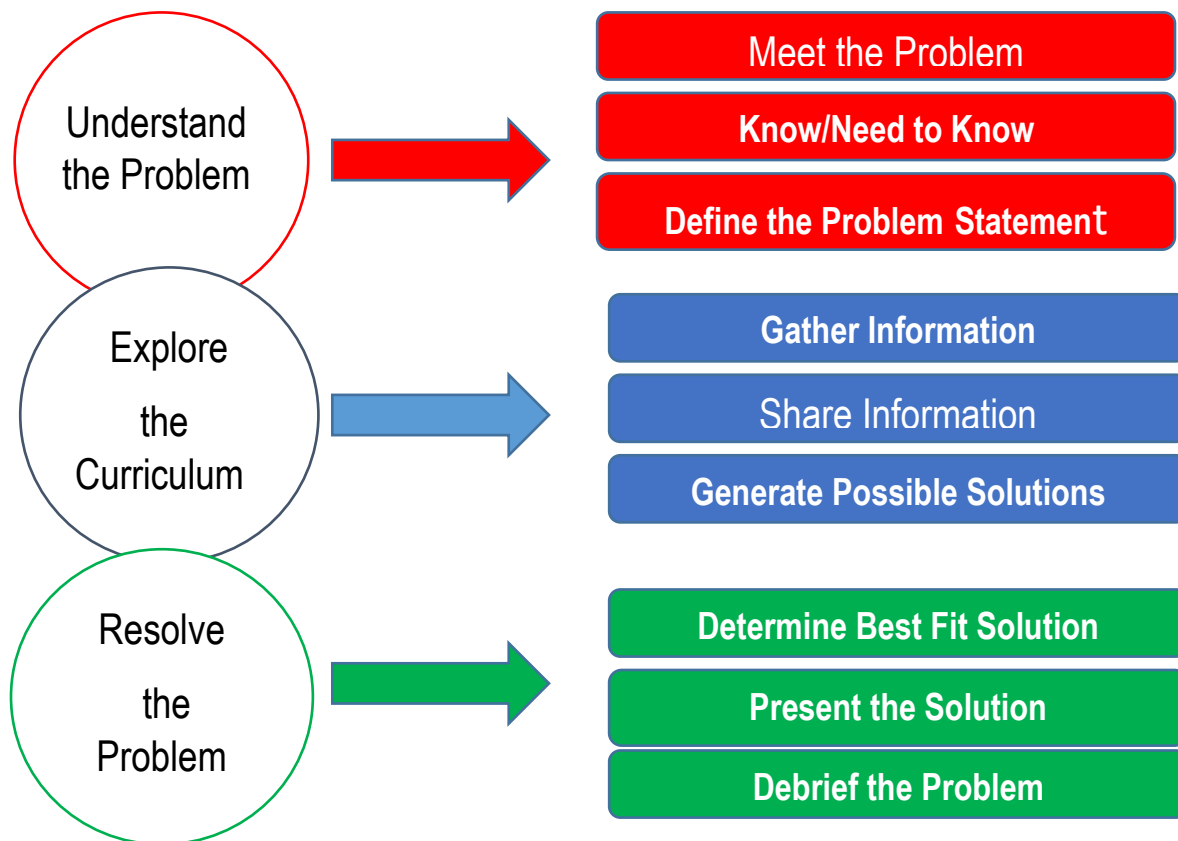
Phase 2:

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.

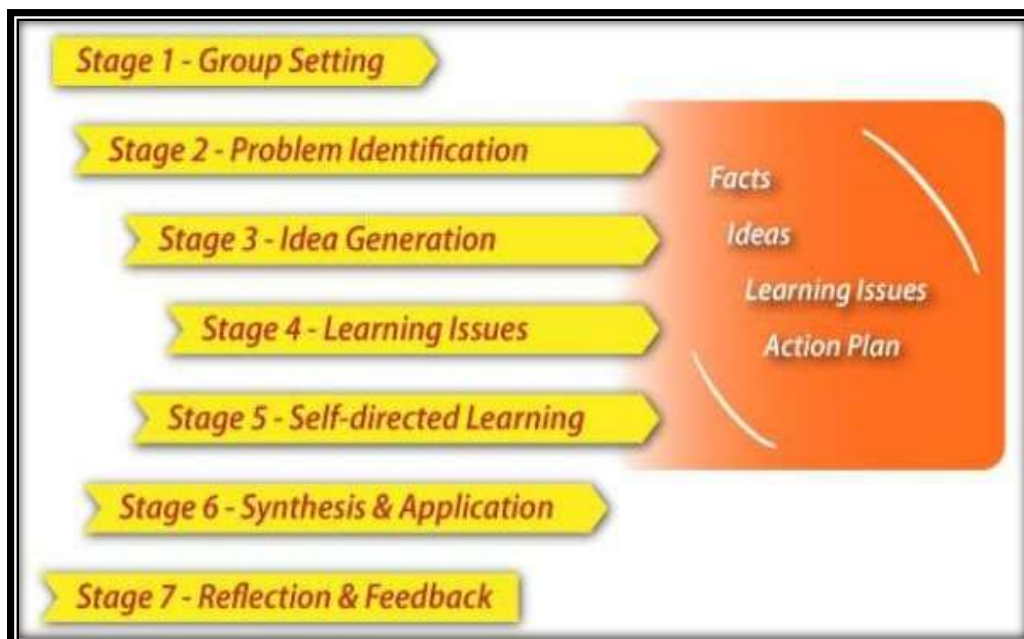
10. Obstacles/Gaps

- 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

SI.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

- i. Cover Page
- ii. Certificate
- iii. Declaration
- iv. Acknowledgement
- v. Table of Contents
- vi. List of Tables
- vii. List of Figures
- viii. Introduction
- ix. Background / Literature Review
- x. Methodology / Solution
- xi. Analysis and Design
- xii. Implementation
- xiii. Results
- xiv. Conclusion and Future Works
- xv. Bibliography / References
- xvi. 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	<ul style="list-style-type: none"> ▪ 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 	<ul style="list-style-type: none"> ▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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 	<ul style="list-style-type: none"> ▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Information supports the solution to the challenge or question. 	<ul style="list-style-type: none"> ▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	<ul style="list-style-type: none"> ▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources 	<ul style="list-style-type: none"> ▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice 	<ul style="list-style-type: none"> ▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently 	<ul style="list-style-type: none"> ▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention.

2	<ul style="list-style-type: none">▪ 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	<ul style="list-style-type: none">▪ More than 5 spelling, grammatical, or punctuation errors▪ Poor use of vocabulary and word choice	<ul style="list-style-type: none">▪ Content is unfocused and haphazard.▪ Information does not support the solution to the challenge or question.▪ Information has no apparent pattern.	<ul style="list-style-type: none">▪ 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	IV Semester
Subject Identified for PBL	Database Management
Prerequisite	There is no Prerequisites to start the Database Management
Justification for the selected subject	This Lab helps students to create, access and manage Database efficiently
List of possible projects	

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	IV			
Course Title	:	Database management system Laboratory			
Course Code	:	BIC406			
Course Type (Theory/ Practical/ Integrated)	:	Problem-Based Learning			
Category	:	PBL			
Stream	:	CSE-ICB		CIE	: 50Marks
Teaching hours/ week (L:T:P:S)	:	0:0:0:2		SEE	: 50Marks
Total Hours	:	25 Hours of 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)

List of Possible Projects

Sl. No.	Projects	COs
1	University Examination Management System: Manage exam schedules, student registrations, question papers, and results processing.	CO1-3
2	Blood Bank Management System: Track donor details, blood inventory, requests, and distribution.	CO1-3
3	Smart City Traffic Management System: Manage traffic signals, vehicle registrations, and congestion analysis.	CO1-3
4	Online Food Ordering System: Handle restaurant menus, customer orders, delivery tracking, and payments.	CO1-3
5	Library Automation System: Automate book borrowing/return, member management, and inventory tracking.	CO1-3
6	College Fest Management System: Manage event schedules, participant registrations, and sponsorship details.	CO1-3
7	Online Voting System: Secure system for voter registrations, candidate details, and voting process.	CO1-3
8	Freight Management System: Manage shipment tracking, logistics, and delivery schedules.	CO1-3
9	Healthcare Information System: Centralized database for patient records, prescriptions, and medical history.	CO1-3
10	Online Examination System: Handle online tests, question banks, and automated grading.	CO1-3
11	Personal Finance Management System: Track income, expenses, budgeting, and financial planning.	CO1-3
12	E-learning Platform: Manage courses, student enrollments, progress tracking, and certifications.	CO1-3

13	Document Management System: Organize, store, and retrieve documents securely.	CO1-3
14	Campus Recruitment System: Manage job postings, student applications, and interview schedules.	CO1-3
15	Rental Property Management System: Handle property listings, tenant details, and lease agreements.	CO1-3
16	Online Auction System: Manage auction listings, bidding process, and payment transactions.	CO1-3
17	Digital Voting System: Secure system for conducting elections and tallying votes.	CO1-3
18	Customer Relationship Management System: Track customer interactions, sales, and support tickets.	CO1-3
19	Supply Chain Management System: Manage suppliers, inventory, orders, and logistics.	CO1-3
20	School Timetable Management System: Automate timetable creation, teacher schedules, and class management.	CO1-3
21	Hotel Booking System: Handle room bookings, customer details, check-in/check-out, and billing.	CO1-3
22	Gym Membership System: Manage member details, subscriptions, attendance, and trainer schedules.	CO1-3
23	Loan Management System: Track loan applications, approvals, repayments, and interest calculations.	CO1-3
24	Waste Collection Management System: Schedule waste pickups, track routes, and manage billing.	CO1-3
25	E-commerce Product Recommendation System: Personalized product recommendations based on user behavior.	CO1-3
26	Vehicle Maintenance Management System: Track service schedules, repair history, and parts inventory.	CO1-3
27	Online Pharmacy System: Manage drug inventory, prescriptions, and customer orders.	CO1-3
28	Travel Booking System: Handle bookings for flights, hotels, and holiday packages.	CO1-3

29	Fleet Management System: Track vehicle usage, maintenance, fuel consumption, and driver details.	CO1-3
30	Online Job Portal: Manage job postings, applicant resumes, and employer details.	CO1-3
31	Community Forum System: Online platform for discussion threads, user posts, and moderation.	CO1-3
32	Hospital Bed Management System: Track bed occupancy, patient admissions, and discharge schedules.	CO1-3
33	Event Ticketing System: Manage ticket sales, attendee details, and event schedules.	CO1-3
34	Weather Forecasting System: Store and analyze weather data, provide forecasts and alerts.	CO1-3
35	Charity Management System: Manage donor details, donation tracking, and fund distribution.	CO1-3
36	Pet Adoption System: Track pet profiles, adoption applications, and foster details.	CO1-3
37	College Course Management System: Manage course offerings, enrollments, and academic records.	CO1-3
38	Visitor Management System: Track visitor registrations, appointments, and access control.	CO1-3
39	Online Grocery Store: Manage product listings, customer orders, and delivery logistics.	CO1-3
40	Subscription Box Service: Handle subscription plans, customer preferences, and shipment tracking.	CO1-3
41	Music Streaming Service: Manage music libraries, user playlists, and streaming analytics.	CO1-3
42	Volunteer Management System: Track volunteer registrations, event participation, and schedules.	CO1-3
43	Online Tutoring Platform: Manage tutor profiles, student bookings, and lesson schedules.	CO1-3
44	Smart Home Management System: Control and monitor home devices, energy usage, and security.	CO1-3

45	Restaurant Inventory System: Track food inventory, supplier details, and order management.	CO1-3
46	Event Feedback System: Collect and analyze attendee feedback for events and conferences.	CO1-3
47	Peer-to-Peer Lending System: Manage loan applications, approvals, repayments, and investor details.	CO1-3
48	Sports Club Management System: Track member details, event schedules, and team management.	CO1-3
49	Retail POS System: Manage sales transactions, inventory, and customer details.	CO1-3
50	Freelance Marketplace: Connect freelancers with clients, manage job postings, and payment processing.	CO1-3
	Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • 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 and apply fundamental concepts and transaction management in databases.	L2,L3	Understand, Apply
CO2	Design and implement relational databases.	L4	Analyze
CO3	Develop and execute basic and advanced SQL commands for database manipulation.	L3, L5	Apply, Evaluate

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	2	2	2	2	1	1	1	1	1	1	1	3	
CO2	3	2	3	2	2	1	1	1	2	2	3	3	3	
CO3	3	2	2	2	3	1	1	1	1	2	1	3	3	

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 for Web Applications Lab (Project Based Learning (PBL)):

This Course refers to project based learning. Credit for this course can be 01 and its Teaching Learning hours (L : T : P: S) can be considered as (0 : 0 : 2 : 0).

Students can create their own individual applications. Each student works independently on their project. These applications should be complete and functional as standalone programs. Students can add extra features to their applications to enhance their functionality, showcasing their creativity and skills.

Projects 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

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



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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

**ABILITY ENHANCEMENT
COURSE (AEC)**

AEC Course – Ability Enhancement Course

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



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	IV		
Course Title	:	Working with IoT		
Course Code	:	BIC407		
Course Type (Theory/ Practical/ Integrated)	:	Practical		
Category	:	AEC		
Stream	:	CSE-ICB	CIE	: 50
Teaching hours/ week (L:T:P:S)	:	0:0:0:2	SEE	: 50
Total Hours	:	15	SEE	: 3
Credits	:	1	Duration	

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn working with basic boards and identify the sensor and acuter
2	Learn to work with advance boards

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
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COURSE CURRICULUM

Module No.	Topics	Hours
1	<ul style="list-style-type: none"> • Buzzer Sensor with Micropython Using Bharatpi Board • Motion detection using pir sensor • Ultrasonic Sensor Using Bharat Pi Arduino (Lora Wifi) 	
Pedagogy		
2	<ul style="list-style-type: none"> • Fire Alarm Using Bharat Pi Arduino (Lora Wifi) • 7-Segment Display Using Using Bharat Pi Arduino (Lora Wifi) • MPU6050 Accelerometer and Gyroscope Using Bharat Pi Arduino (Lora Wifi) 	
Pedagogy		
3	<ul style="list-style-type: none"> • Temperature And Humidity Sensor with Micro Python Using Arduino Nano Development Board (Lora) • Barometric Pressure and Altitude Sensor 12C/ SPI Module Using Arduino Nano Development Board (Lora) 	
Pedagogy		
4	<ul style="list-style-type: none"> • Soil Moisture Sensor Module Using Bharart Pi Board • Smart RFID Cloud Integration Using Bharart Pi Board • OLED Sensor With Micropython Using Bharart Pi Boardin • Optical Fingerprint Sensor Module –As608 Using Bharart Pi Board 	
Pedagogy		
5	<ul style="list-style-type: none"> • KY-036 Metal Touch Sensor Module Using Bharart Pi Board • LCD Sensor With Micropython Using Bharart Pi • IR Infrared Sensor with Bharat Pi • Smoke Detector Using MQ-2 Gas Sensor And Bharat Pi 	

Weblinks and Video Lectures (e-Resources)

1	https://bharatpi.net/
2	https://www.youtube.com/watch?v=j1OFhsznD7E
3	https://www.youtube.com/watch?v=a1c67aabqZ0&list=PL1_hel_xfTPKoGiqPbS-8c4IkYGGzS24a
4	

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				
Apply				
Analyse	50	50	50	50
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								

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.

