Pimpri Chinchwad Education Trust's

Pimpri Chinchwad College of Engineering

Sector No. 26, Pradhikaran, Nigdi, Pune 411044

An Autonomous Institute Approved by AICTE and AFFILIATED to SPPU, Pune

Department of Information Technology

Curriculum Structure and Syllabus
of
Honors and Minors in
B. Tech. Information Technology

Effective from Academic Year 2021-22

VISION AND MISSION OF INSTITUTE

Institute Vision

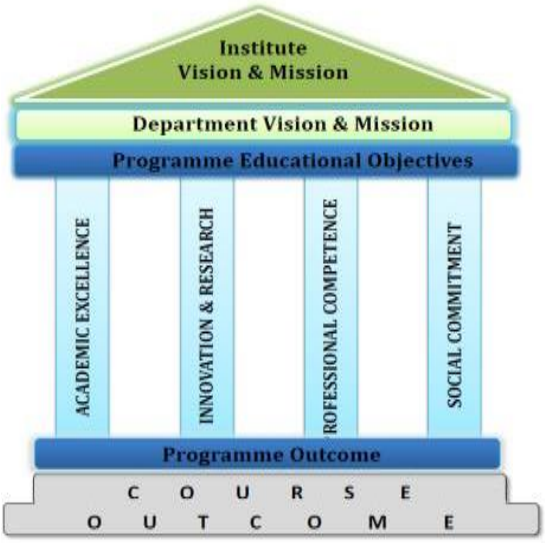
To Serve the Society, Industry and all the Stakeholders through the **Value-Added Quality Education.**

Institute Mission

To serve the needs of society at large by establishing State-of-the-Art Engineering, Management and Research Institute and impart attitude, knowledge and skills with quality education to develop individuals and teams with ability to think and analyze right values and self-reliance.

Quality Policy

We at PCCOE are committed to impart Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders. We shall strive for academic excellence, professional competence and social commitment in fine blend with innovation and research. We shall achieve this by establishing and strengthening state-of-the-art Engineering and Management Institute through continual improvement in effective implementation of Quality Management System.



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Honors in Blockchain Technology

Curriculum Structure- Honors in Blockchain Technology

Semester – V		Teaching Scheme					Evaluation Scheme						
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**IE1**	**IE2**	**ETE**	**TW**	**PR**	**OR**	**Total**
HIT5981	Blockchain Foundations and Use cases	4	-	-	4	4	20	30	50	-	-	-	100
HIT5982	Blockchain Laboratory	-	-	2	2	1	-	-	-	50	-	-	50
Total		**4**	**-**	**2**	**6**	**5**	**20**	**30**	**50**	**50**	**-**	**-**	**150**
Semester – VI		**Teaching Scheme**					**Evaluation Scheme**						
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**IE1**	**IE2**	**ETE**	**TW**	**PR**	**OR**	**Total**
HIT6981	Smart Contracts & Crypto currencies	4	-	-	4	4	20	30	50	-	-	-	100
HIT6982	Smart Contracts & Crypto currency Laboratory	-	-	2	2	1	-	-	-	25	-	25	50
Total		**4**	**-**	**2**	**6**	**5**	**20**	**30**	**50**	**25**	**-**	**25**	**150**
Semester – VII		**Teaching Scheme**					**Evaluation Scheme**						
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**IE1**	**IE2**	**ETE**	**TW**	**PR**	**OR**	**Total**
HIT7981	Decentralize & Blockchain Technologies	3	-	-	3	3	20	30	50	-	-	-	100
HIT7982	Seminar	-	2	-	2	2	-	-	-		-	50	50
Total		**3**	**2**	**-**	**5**	**5**	**20**	**30**	**50**		**-**	**50**	**150**
Semester – VIII		**Teaching Scheme**					**Evaluation Scheme**						
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**IE1**	**IE2**	**ETE**	**TW**	**PR**	**OR**	**Total**
HIT8981	Project	-	-	10	10	5	-	-	-	50	-	100	150
Total		**-**	**-**	**10**	**10**	**5**	**-**	**-**	**-**	**50**	**-**	**100**	**150**
Total Credit for Semester V+VI+VII+VIII = 20													

***To be offered as Honors for Major Disciplines as–**

1. Electronics Engineering
2. Electronics and Telecommunication Engineering
3. Electronics & Computer Engineering
4. Computer Engineering
5. Information Technology

For any other Major Disciplines which is not mentioned above, it may be offered as Minor Degree.

Abbreviations: Course Abbreviation; **L**- Lecture; **P**- Practical; **H**- Hours; **CR**- Credits; **IE**– Internal Evaluation-1; **MTE** – Mid Term Examination **ETE** – End Term Examination; **TW** – Term Work; **OR** – Oral Exam.

Program:	B. Tech. (IT/Comp/EnTC-Honors)			Semester :	V		
Course : **Blockchain Foundations and Use cases**				Code : **HIT5981**			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**IE1**	**IE2**	**ETE**	**Total**
4	-	-	4	20	30	50	100

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Technology behind Blockchain
2. Emerging trends in Blockchain
3. Real-world applications of Blockchain.

Course Outcomes:

After learning the course, the students should be able to:

1. Identify the importance of Blockchain technology
2. Interpret the fundamentals and basic concepts in Blockchain
3. Summarize the requirements of the basic design of Blockchain.
4. Compare the working of different blockchain platforms
5. Summarize the different technologies and latest trends in Blockchain
6. Analyze the importance of Blockchain in finding the solution to the real-world problems.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
1	**Introduction to Blockchain Technology:** Basic ideas behind block chain, how it is changing the landscape of digitalization, introduction to cryptographic concepts, Hashing, public key cryptosystems, private vs public block chain and use cases, Hash Puzzles	8
2	**Blockchain Fundamentals:** Basic architecture of Blockchain, different terminologies associated, Characteristics of Block chain, Types of networks, Introducing Smart contract concept in Blockchain.	8
3	**Components of Blockchain:** Core components of Blockchain, Types of Block chains; Blockchain Protocol, Permission & Permission less Block chains,	8
4	**Digital Ledger:** Short History of Money and Trust, Bitcoin Mechanics, Introduction to Ethereum, Introduction to Hyperledger, Hyperledger Fabric and its architecture, Hyperledger Composer	6
5	**Emerging Trends in Blockchain:** Cloud-based block chain, Multi chain, Geth , Stellar , Ripple, R3 Corda, Blockchain API, Blockchain Sandboxes	8
6	**Blockchain Use Cases:** Supply Chain Management, Finance, Health Care, Internet of Things (IoT), Remittance, Land Records, Voting and election, Loyalty Programs, Go Green (Renewable Energy)	10
	Total	**48**

Text Books:

1. Artemis Caro, "Blockchain: The Beginners Guide to Understanding the Technology Behind Bitcoin & Crypto currency".
2. Scott Marks, "Blockchain for Beginners: Guide to Understanding the Foundation and Basics of the Revolutionary Blockchain Technology", Create Space Independent Publishing Platform

Reference Books:

1. Mark Watney, "Blockchain for Beginners".
2. Alwyn Bishop, "Blockchain Technology Explained".

e-sources:

1. NPTEL Course **"Introduction to Blockchain Technology & Applications"**

   https://nptel.ac.in/courses/106/104/106104220/

2. NPTEL Course on **"Blockchain Architecture &UseCases"**
   https://nptel.ac.in/courses/106/105/106105184/

Program:	B. Tech. (IT/Comp/EnTC-Honors)			Semester :	V		
Course : **Blockchain Laboratory**				Code : **HIT5982**			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	2	-	1	50	-	-	50

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. The working of blockchain technology
2. The real-world applications of blockchain.

Course Outcomes:

After learning the course, the students should be able to:

1. Apply Cryptography and Blockchain concepts
2. Recognize the underlying technology of transactions, blocks, proof-of-work, and consensus building
3. Analyze and compare between Direct Acyclic Graph and Blockchain Technology
4. Execute smart contract in Remix IDE(or in any Integrated Environment)
5. Analyze Blockchain models by considering various use cases.
6. Interpret the process of solving puzzles for mining

Suggested list of assignments

Sr. No.	List of Assignments (Any Five)	Duration (H)
1.	Naïve Blockchain construction	2
2.	Memory Hard algorithm-Hashcash implementation	2
3.	Direct Acyclic Graph	2
4.	Implement simple Smart Contracts in Remix IDE	2
5.	Toy application using Blockchain	2
6.	Mining puzzles	2
	Total	**12**

Program:	B. Tech. (IT/Comp/EnTC-Honors)			Semester :	VI		
Course :Smart Contracts & Crypto currencies				Code : HIT6981			
Teaching Scheme				Evaluation Scheme			
Lecture	**Practical**	**Tutorial**	**Credit**	**IE1**	**IE2**	**ETE**	**Total**
4	-	-	4	20	30	50	100

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Crypto currency, Bitcoin and Smart contracts
2. Study public blockchain platforms such as Ethereum.

Course Outcomes:

After learning the course, the students should be able to:

1. Interpret the concept of smart contracts in blockchain.
2. Illustrate the Ethereum public blockchain platform
3. Interpret the need and working of crypto currency
4. Illustrate the cryptocurrency regulations
5. Recognize the underlying technology of transactions, blocks, Bitcoins
6. Categorize and study the different cognitive applications on different platforms

Detailed Syllabus:

Unit	Description	Duration [Hrs]
1	**Smart Contracts:** Introduction to Smart Contracts, Structure of Smart Contract, Smart Contract Interaction, Contracts, Patterns and Smart Contracts Examples.	8
2	**Ethereum Blockchain Components:** Introduction to Ethereum Development Tools, Ethereum Clients, Ethereum Languages, Ethereum Wallets, Ethereum Accounts, Ethereum Key pairs, Ethereum Platform	8
3	**Crypto currency** :History Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Side chain, Name coin.	8
4	**Crypto currency Regulation:** Stakeholders, Roots of Bitcoin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain for crypto currencies.	8
5	**Bitcoins:** Introduction to Bitcoins, Bitcoin : Digital Signature, Digital Keys, Private Keys, Public Keys, Bitcoins Addresses, Bitcoins Transactions, Bitcoins Network, Bitcoins Wallets, Bitcoins Payments, Bitcoins Clients and APIs, Bitcoins Limitation	8
6	**Case studies of Block Chain in Cognitive applications:** IBMBlockchain, Blockchain in Health care Innovation, AI Marketplaces, Investment Management Platforms, Future of AI and Blockchain.	8
	Total	**48**

Text Books:

Arvind Narayanan, Joseph Bonneau, EdwardFelten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press.

2. Antonopoulos, "Mastering Bitcoin: Unlocking DigitalCryptocurrencies"

Reference Books:

1. Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic CashSystem".
2. Dr. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger", Yellow paper2014.
3. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, "A survey of attacks on Ethereum smart contracts"

e-sources:

1. NPTEL Course **"Introduction to Block Chain Technology& Applications"**

   https://nptel.ac.in/courses/106/104/106104220/

2. NPTEL Course on **"Blockchain Architecture &UseCases"**
   https://nptel.ac.in/courses/106/105/106105184/

Program:	**B. Tech. (IT/Comp/EnTC-Honors)**					Semester: **VI**	
Course: **Smart Contracts & Crypto currency Laboratory**						Code: **HIT6992**	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Credit**	**Hours**	**TW**	**OR**	**PR**	**Total**
-	2	1	2	25	25	-	50

CourseObjectives:

1. To design bitcoin application
2. To implement the real-world applications of blockchain.

CourseOutcomes:

After learning the course, the students will be able to:

1. Design and implement Bitcoin application.
2. Setup the Ethereum development environment.
3. Implement smart contracts in Ethereum Blockchain
4. Test the smart contract to find the vulnerabilities present in the code
5. Summarize the importance of blockchain technology in different cognitive applications

Suggested list of assignments		
Sr. No.	**Description**	**Duration (H)**
1.	Install and Get Started with the Bitcoin core client. Write a program to get Bitcoin and create transactions.	2
2.	Setup the Ethereum development environment. Generate addresses and create transactions.	2
3.	Write a program to create smart contracts and implement applications on Ethereum.	2
4.	Create smart contract and test the contract (against smart contract vulnerabilities)	2
5.	Case studies on Cognitive computing	2
Total		**10**

Program:	B. Tech. (IT/Comp/EnTC-Honors)			Semester :	VII		
Course :Decentralize & Blockchain Technologies				Code : HIT7991			
Teaching Scheme				Evaluation Scheme			
Lecture	**Practical**	**Tutorial**	**Credit**	**IE1**	**IE2**	**ETE**	**Total**
3	-	-	3	20	30	50	100

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Decentralized systems and applications
2. Different consensus algorithms used in blockchain
3. Blockchain attacks and security.

Course Outcomes:

After learning the course, the students will be able to:

1. Categorize and identify decentralized systems
2. Illustrate the importance of decentralized applications
3. Compare the working of different consensus algorithms in Blockchain
4. Summarize the working of Hyperledger Fabric private blockchain platform
5. Identify Blockchain vulnerabilities, attacks and defense techniques
6. Identify relative application where blockchain technology can be effectively used and implemented.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
1	**Decentralized Systems:** Introduction to Decentralized System, Disintermediation, Contest Driven, Framework and Ecosystem for Decentralized System.	8
2	**Decentralized Applications:** Introduction to Decentralized Applications, Blockchain Mining, Whisper, Swarm, Forks.	8
3	**Consensus and Fault Tolerances:**Consensus Approach, Consensus Elements, Consensus Algorithms, Proof of Work, Byzantine General problem, Proof of Stake, Proof of Elapsed Time, Proof of Activity, Proof of Burn.	8
4	**Hyperledgers:** Hyperledger Fabric, Saw tooth, Indy, Hyperledger tools Caliper and Hyperledger library Ursa, Blockchain as-a-service deployment model of Hyperledger Cello.	8
5	**Blockchain Technologies Security, Attacks and defence:** Pseudo-anonymity vs. anonymity, Zcashand Zk-SNARKS for anonymity preservation, Attacks on Blockchains: Sybil attacks, selfish mining and 51% attacks; Advent of Algorand ,and Sharding based consensus algorithms to prevent the attacks	8
6	**BlockChain Technology And Applications:**Selection of Blockchain technology, Determining the business needs, Defining the goal and Choosing a Solution, Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain	4
	Total	**48**

Text Books:

1. J.H. Huiwitz, M.Kaufman, A.Bowles, " Cognitive Computing & Big Data Analystics",Wiley Publication

Reference Books:

1. A. Reyana, C.Martin, J.Chen, E.Soler, M.Diaz, "On blockchain and its integration with IoT challenges & Opportunities" Paper in Future Generation Computer Systems, Vol. 88, Nov. 2018, pp.173-190.

2. H.F.Atlam, Muhammad A.A.,A.G. Alzaharani, G. Wills, "A review of Blockchain in Internet of Things and AI",paper in Big Data and Cognitive Computing, Vol.4, Issue 28, Oct.2020

e-sources:

1. NPTEL Course **"Machine Learning"**
https://nptel.ac.in/courses/106/106/106106202/

Program:	B. Tech. (IT/Comp/EnTC-Honors)			Semester :	VII		
Course : **Seminar**				Code : **HIT7992**			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Presentation**	**TW**	**OR**	**Total**
-	-	2	2	50	-	-	50

Course Objectives:

Seminar should make the student attain skills like-

1. To gather the literature of specific areas in a focused manner.
2. To summarize the literature to find state-of-the-art in the proposed area.
3. To identify scope for future work.
4. To present the case for the intended work to be done as a project.
5. To report literature review and proposed work in scientific way

Course Outcomes:

On completion of the course, students will be able to–

1. Interpret and summarize technical literature.
2. Demonstrate the techniques used in the paper.
3. Distinguish the various techniques required to accomplish the task.
4. Identify intended future work based on the technical review.
5. Prepare and present the content through various presentation tools and techniques in an effective manner.
6. Keep audience engaged through improved interpersonal skills

Seminar is a course requirement where in under the guidance of a faculty member a student is expected to do an in depth study on the topic relevant to latest trends in the field of concerned Honors degree selected by him / her and approved by the authority; by doing literature survey, understanding different aspects of the problem and arriving at a status report in that area. While doing a seminar, the student is expected to learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study concepts, techniques, prevailing results etc., analyze it and present a seminar report. It is mandatory to give a seminar presentation before a panel constituted for the purpose. The grading is done on the basis of the depth of the work done, understanding of the problem, report and presentation by the student concerned.

GUIDELINES FOR THE SEMINAR

A. Guidelines for preparation of Report:

- Report should have at least 30 and at most 50 pages.
- The entire pages of the report should be in A4 size strictly, with 1" top and bottom margin and 1.25" left and right margin.
- The entire report should be typed in Times New Roman with **(12Pt.)**
- The title and main headings of the paragraphs are to be in bold.
- Report may be divided into the number of chapters as required, with chapter number assigned on the top left corner and chapter name immediately below it (with single line spacing) using Times New Roman **(16 Pt.Bold).**

- Every sub heading should be given a decimal of the whole number of the heading.(e.g1.1).
- The complete text should be justified in the report (no left or right aligning).
- No short forms are to be used in the report besides the specified areas.
- Numbering of each figure and table should be done according to the chapter number.
- Numbering of each page should be done in the footer section at the bottom right corner.
- Each line should be separated by a line spacing of 1.5, and each paragraph by line spacing of 2..

B. List of Contents in the Report:

- The Cover
- Cover page. (Same as The Cover)
- Certificate from Department
- Acknowledgement.
- Abstract.
- Table of content.
- List of figures and tables
- The report.
- References and appendices.

C. Guidelines for Presentation:

- The presentation shall be limited to 15 minutes plus 10 minutes questions and answers. There will be credit for the novelty of the topic, contents of the seminar, the effectiveness of presentation, and the way questions and queries are answered.
- Presentations shall be prepared using presentation software like MS PowerPoint. If necessary, use charts, drawings, etc.
- Write only points on the slides (use telegraphic language instead of long sentences). The slides shall NOT be a copy of the text of one's seminar report. Ideally 6 to 8 lines only shall be there on each slide.
- Equations shall be given in the final form only. Derivations shall be avoided on slides. However, the derivations can be prepared as separate slides with links from the main presentation so that the same can be used if need arises.
- Use colors to make the slides attractive and to highlight the important points. However, remember that the use of too many different colors can make the slides ugly.
- Choose the letter sizes corresponding to the importance of the points. Use bold/italics or different colors to stress words or sentences of importance.
- Ensure that all the material presented on slides is legible when projected.

Reading of the written/typed material or from the slides is not acceptable.

Program:	B. Tech. (IT/Comp/EnTC-Honors)	Semester :	VIII
Course : **Project**		Code : **HIT8991**	

Teaching Scheme				Evaluation Scheme			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	10	-	5	50	100	-	150

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Implement their ideas/real time industrial problems and current applications from their engineering domain.
2. Develop plans with help of team members to achieve the project's goals.
3. Break work down into tasks and determine appropriate procedures.
4. Estimate and cost the human and physical resources required, and make plans to obtain the necessary resources.
5. Allocate roles with clear lines of responsibility and accountability and learn team work ethics.
6. Apply communication skills to effectively promote ideas, goals or products.

Course Outcomes:

After learning the course, the students should be able :

1. Identify the real life problem from societal need point of view
2. Choose and compare alternative approaches to select most feasible one
3. Analyze and synthesize the identified problem from technological perspective
4. Design the reliable and scalable solution to meet challenges
5. Evaluate the solution based on the criteria specified
6. Inculcate long life learning attitude towards the societal problems

GUIDELINES FOR THE PROJECT

- The Head of the department/Project coordinator shall constitute a review committee for the project group; project guide would be one member of that committee by default.
- There shall be 4 reviews by the review committee.
- The Project Review committee will be responsible for evaluating the timely progress of the projects.
- As far as possible Students should finalize the same project title taken for Project Based Seminar (PBS).
- Student should Identify Project of enough complexity, which has at least 4-5 major functionalities
- Student should identify stakeholders, actors and write detail problem statement for system
- Review committee should revisit “Feasibility Review” conducted by Examiners during Oral examination in Third year in the first week after commencement of the term.
- Review committee should finalize the scope of the project.

- The students or project group shall make a presentation on the progress made by them before the committee.
- The record of the remarks/suggestions of the review committee should be properly maintained and should be made available at the time of examination.
- Each student/group is required to give a presentation as part of review for 10 to 15 minutes followed by a detailed discussion.
- Students should revisit and Reassess the problem statement mentioned in the project-based seminar activity.

Review 1: Synopsis –

Deliverables:

1. The precise problem statement/title based on literature survey and feasibility study.
2. Purpose, objectives and scope of the project.List of required hardware, software or other equipment for executing the project, test Environment/tools, cost and human efforts in hours.
3. System overview- proposed system and proposed outcomes.
4. Architecture and initial phase of design (DFD).
5. Project plan 1.0.

Review 2: SRS –Deliverables:

1. SRS and High level design
2. Detail architecture/System design/algorithms/techniques
3. At least 30-40% coding documentation with at least 3 to 4 working modules
4. Test Results
5. Project plan 2.0

Review 3: Based on Implementation (50% implementation expected)

Review 4: Complete Project and Testing

Project report contains the details as Follows:

One paper should be published in a reputed International conference/International journal based on project work done.

Contents
List of
Abbreviations
List of Figures
List of Graphs List of

Tables

1. Introduction and aims/motivation and objectives
2. Literature Survey
3. Problem Statement/definition
4. Project Requirement specification
5. Systems Proposed Architecture
6. High level design of the project(DFD/UML)
7. System implementation-code documentation-algorithm, methodologies, protocols used.
8. GUI/Working modules/Experimental Results
9. Project Plan
10. Conclusions
11. Bibliography in IEEE

format Appendices

A. Plagiarism Report of Paper and Project report from any open source tool
B. Base Paper(s)
C. Tools used
D. Papers Published/Certificates

Use appropriate plagiarism tools, reference managers, Latex Lyx/latest Word for efficient and effective project writing.

Term Work:

The term work will consist of a report and presentation prepared by the student on the project allotted to them.

Minors in Software Development

Curriculum Structure: Minors Software Development

Semester – V		Teaching Scheme					Evaluation Scheme					
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**CE**	**ETE**	**TW**	**PR**	**OR**	**Total**
MIT9591	Object-Oriented Programming	3	-	-	3	3	50	50	-	-	-	100
MIT9592	Object-Oriented Programming Laboratory	-	-	2	2	1	-	-	-	-	25	25
Total		**3**	**-**	**2**	**5**	**4**	**50**	**50**	**-**	**-**	**25**	**125**

Semester – VI		Teaching Scheme					Evaluation Scheme					
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**CE**	**ETE**	**TW**	**PR**	**OR**	**Total**
MIT6991	Data Structure and Algorithms	3	-	-	3	3	50	50	-	-	-	100
MIT6992	Data Structure and Algorithms Laboratory	-	-	4	4	2	-	-	25	25	-	50
Total		**3**	**-**	**4**	**7**	**5**	**50**	**50**	**25**	**25**	**-**	**150**

Semester – VII		Teaching Scheme					Evaluation Scheme					
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**CE**	**ETE**	**TW**	**PR**	**OR**	**Total**
MIT7991	Database Management System	3	-	-	3	3	50	50	-	-	-	100
MIT7992	Database Management System Laboratory	-	-	2	2	1	-	-	-	25	-	25
MIT7993	Software Engineering	3	-	-	3	3	50	50	-	-	-	100
Total		**6**	**-**	**2**	**8**	**7**	**100**	**100**	**-**	**25**	**-**	**225**

Semester – VIII		Teaching Scheme					Evaluation Scheme					
Course Code	**Course Name**	**L**	**T**	**P**	**H**	**Cr**	**CE**	**ETE**	**TW**	**PR**	**OR**	**Total**
MIT8991	**Project**	-	-	8	8	4	-	-	50	-	50	100
Total		**-**	**-**	**8**	**8**	**4**	**-**	**-**	**50**	**-**	**50**	**100**

Total Credit for Semester V+VI+VII+VIII = 20

***To be offered as Minor for Major Disciplines as–**

1. Civil Engineering
2. Mechanical Engineering

Abbreviations: Course Abbreviation; **L-** Lecture; **P-** Practical; **H-** Hours; **CR-** Credits; **IE**– Internal Evaluation-1; **MTE** – Mid Term Examination **ETE** – End Term Examination; **TW** – Term Work; **OR** – Oral Exam.

Program:	B. Tech. (Mechanical/Civil-Minors)					Semester: V
Course:	**Object Oriented Programming**					**Code: MIT9591**
Teaching Scheme				**Evaluation Scheme**		
Lecture	**Tutorial**	**Credit**	**Hours**	**CE**	**ETE**	**Total**
3	-	3	3	50	50	**100**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Learn fundamentals of object-oriented concepts and programming
2. Apply the concepts of object-oriented paradigm.
3. Design and implement applications using object oriented programming.

Outcomes:

After learning the course, the students will be able to:

1. Construct classes for given real life data and operations.
2. Apply operator overloading to develop programs
3. Design hierarchy of classes using inheritance.
4. Make use of polymorphism using virtual function and exception handling to develop programs
5. Apply generic programming using templates.
6. Develop an application using file handling

Detailed Syllabus

Unit	Description	Duration
1.	**FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING** objects, classes, data members, member functions, data encapsulation, data abstraction and information hiding, inheritance, polymorphism. Access Control, constructors, destructors, operators, static data members, array of objects, 'const' keyword and reference variables.	6
2.	**FUNCTIONS AND OPERATOR OVERLOADING** Function prototypes, default and constant arguments, inline functions, static member functions, Function overloading, friend function, Operator Overloading : Need, rules, overloading the unary and binary operators using member and friend function, overloading relational and and assignment operator	6
3.	**INHERITANCE** Need of inheritance, base and derived classes, member access control, types of inheritance, derived class constructor, constructors in multiple inheritance, overriding member functions, ambiguity in multiple inheritance and virtual base class.	6
4.	**VIRTUAL FUNCTIONS AND EXCEPTION HANDLING** Pointers to objects, 'this' pointer, Pointers to derived class, virtual function, pure virtual function, abstract class, virtual destructors, early and late binding Exception Handling: try, catch and throw, Multiple Exceptions, Exceptions with arguments.	6
5.	**TEMPLATES** Function template and class template, overloading function template, member function templates and template arguments, Introduction to Standard Template Library (STL), containers, iterators and algorithms. Template class-List, Vector	6

6.	**FILE I/O** Classes for file stream operations, file operations (open, close, read, write, detect end of file), file modes, File pointers and their manipulations (sequential and random access), error handling during file operations.	6
	Total	**36**

Text Books:

1. E. Balaguruswamy, "Object-oriented Programming with C++", Tata McGraw Hill, 7th edition.
2. Robert Lafore, "Object-Oriented Programming in C++", SAMS Techmedia

Reference Books:

1. Herbert Schildt, "C++: The Complete Reference", McGraw-Hill.
2. Kogent, "Object-Oriented Programming Methodology", Wiley, ISBN-9789351191841

Program:	B. Tech. (Mechanical/Civil-Minors)					Semester: V	
Course:	**Object Oriented Programming Laboratory**					**Code: MIT9592**	
Teaching Scheme				**Evaluation Scheme**			
Practical	**Tutorial**	**Credit**	**Hours**	**TW**	**Oral**	**PR**	**Total**
2	-	1	2	-	-	25	**25**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Apply the concepts of object oriented paradigm.
2. Develop object oriented programming skills.
3. Design and implement applications for real life problems using object oriented programming.

Outcomes:

After learning the course, the students will be able to:

1. Construct classes for given real life data and operations.
2. Develop programs which utilizes the concept of operator overloading.
3. Design hierarchy of classes using inheritance.
4. Implement programs using virtual function and exception handling
5. Construct a program using templates.
6. Develop an application using file handling

Detailed Syllabus

Assignment	Suggested List of Assignments
1	Create a class named weather report that holds a daily weather report with data members day_of_month, hightemp, lowtemp, amount_rain and amount_snow. Use different types of constructors to initialize the objects. Also include a function that prompts the user and sets values for each field so that you can override the default values. Write a menu driven program in C++ with options to enter data and generate monthly report that displays average of each attribute
2	Design a class 'Distance' with data members distance in kilometers, meters and centimeters Provide default and parameterized constructors. Write a program using operator overloading 1. Addition using friend function Subtraction using member function
3	An organization has to maintain information of employees for calculation of salary. An employee can be a waged or fixed salaried employee. A waged employee is paid on an hourly basis. If a salesperson is a waged employee who is paid commission on sales made. Design all the above classes and implement member functions to accept employee details, display and compute salary of an employee
4	Create a base class shape with two double type values and member functions to input the data and compute_area() for calculating area of figure. Derive two classes' triangle and rectangle. Make compute_area() as a virtual function and redefine this function in the derived class to suit their requirements. Write a program that accepts dimensions of triangle/rectangle and displays calculated area. Display error codes and messages by using appropriate try and catch block to handle the exceptions thrown

5	Write a program in C++ using function/class template to read two matrices of different data types such as integers and floating point values and perform simple arithmetic operations on these matrices separately and display it.
6	Write a program in C++ to implement a sequential file. Design a base class with name, date of birth, blood group and another base class consisting of the data members such as height and weight. Design one more base class consisting of the insurance policy number and contact address. The derived class contains the data members' telephone numbers and driving license number. Write a menu driven program to carry out the following things: 1. Build a master table 2. Display 3. Insert a new entry 4. Delete entry 5. Edit Search for a record

Text Books:

1. E. Balaguruswamy, "Object-oriented Programming with C++", Tata McGraw Hill, 5th edition.
2. Robert Lafore, "Object-Oriented Programming in C++", SAMS Techmedia

Reference Books:

1. Herbert Schildt, "C++: The Complete Reference", McGraw-Hill.
2. kogent, "Object-Oriented Programming Methodology", Wiley, ISBN-9789351191841

Program:	B. Tech. (Mechanical/Civil-Minors)				Semester: VI	
Course:	Data Structures and Algorithms				Code: MIT6991	
Teaching Scheme				Evaluation Scheme		
Lecture	Tutorial	Credit	Hours	CE	ETE	Total
3	-	3	3	50	50	**100**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Analyze algorithms with respect to time and space complexity.
2. Select appropriate searching and sorting techniques in the application development.
3. Apply linear and non-linear data structures to the applications.

Outcomes:

After learning the course, the students will be able to:

1. Analyze algorithms with respect to time and space complexity.
2. Compare and select appropriate searching and sorting techniques in the application development.
3. Construct Linear data structures using arrays and linked lists.
4. Make use of abstract properties of stack and queue data structures.
5. Apply algorithms to create and traverse non-linear data structure trees.
6. Solve the concept of graphs for various problems.

Detailed Syllabus

Unit	Description	Duration
2	**Introduction to Data Structures and Analysis of Algorithms** Basics of Data structure, Types, Analysis of algorithm: frequency count, Time & Space complexity, Big 'O', 'Ω' and 'Θ' notations, Best, Worst, and Average case.	6
2.	**Linear Data Structures** Sequential organization: One dimensional and Multidimensional arrays and their storage representation: row-major and column-major form and address calculation. Linked organization: Types of linked list, its operations, applications	6
3.	**Stacks and Queue** Stack as an ADT, implementation of the stack, applications. Queue as an ADT, implementation of the queue, types and applications.	6
4.	**Trees** Trees terminology, and binary trees. Expression tree. Conversion of the general tree to binary tree. Binary tree as an ADT. Binary tree traversals, Binary search trees, Applications.	6
5.	**Graphs** Graph terminology, Representation of graphs, Depth First Search and Breadth-First Search traversal. Algorithms for minimum spanning tree, shortest path algorithm, applications.	6
6	**Searching and Sorting** Searching and sorting algorithms and its Complexity analysis.	6
	Total	**36**

Text Books:

1. E. Horowitz, S. Sahani, S. MEhata, Dinesh, "Fundamentals of Data Structures in C ++", Universities Press, (2008)
2. Aho, Alfred V., Hopcroft, John. E., Ullman Jeffrey D, " Data Structures And Algorithms", Pearson Prentice Hall.

Reference Books:

1. G. A.V. Pai, "Data Structures and Algorithms ", McGraw Hill, ISBN -13: 978-0-07-066726-6
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.
3. J. Tremblay, P. Soresan, "An Introduction to Data Structures with Applications", 2nd edition, Tata McGraw Hill International Editions, 1984, ISBN-0-07-462471-7.

Program:	B. Tech. (Mechanical/Civil-Minors)					Semester: VI	
Course:	Data Structures and Algorithms Laboratory					Code: MIT6992	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	OR	PR	Total
-	4	-	2	25	-	25	50

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Analyze algorithms with respect to time and space complexity.
2. Implement abstract properties of various linear and non-linear data structures

Outcomes:

After learning the course, the students will be able to:

1. Select appropriate searching and sorting techniques in the application development.
2. Make use of abstract properties of various data structures such as stacks, queues.
3. Implement non-linear data structures such as trees, graphs.

Assignment No.	Suggested List of Assignments (Write any 6 programs in C++)
1.	Represent sets using one-dimensional arrays and implement functions to perform i. Union ii. Intersection iii. Difference iv. Symmetric difference of two sets
2.	Implement a Polynomial with operations like creates a polynomial, insert an entry into a polynomial, add two polynomials and evaluate a polynomial.
3.	Implement any database using a doubly-linked list with the following options a. Insert a record b. delete a record c. modify a record d. Display list forward Display list backward
4.	Implement stack as an abstract data type using linked list and use this ADT for conversion of infix expression to postfix, prefix, and evaluation of postfix and prefix expression.
5.	Implement Circular Queue using Array. Perform following operations on it. 1. Insertion (Enqueue) 2. Deletion (Dequeue) 3. Display
6.	Implement binary search tree and perform the following operations: a. Insert b. Delete c. Search d. Mirror image e. Display f. Display level-wise (algorithmic analysis)

7.	Represent any real-world graph using adjacency list /adjacency matrix find minimum spanning tree using Prim's algorithm.
8.	Write a Menu driven program for a cricket player's display board. The information of the cricketer can be (not limited to) Name, Age, Country, Category (Batsman, Bowler, Wicket keeper, All-rounder), Number of ODI's played, Number of International 20-20's played. Display following. (Any four) a. Number of batsman of a particular country b. Sort the Batsman as per the average batting score(Any sort) c. Batsman with highest average score (Binary search) d. Number of bowlers of a particular country e. The bowler that has taken a maximum no of wickets f. Show particular players the entire "Display board information" Delete/Modify the record

Reference Books:

1. G. A.V. PAI, "Data Structures and Algorithms ", McGraw Hill, ISBN -13: 978-0-07-066726-6
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.
3. J. Tremblay, P. Soresan, "An Introduction to Data Structures with Applications", 2nd edition, Tata McGraw Hill International Editions, 1984, ISBN-0-07-462471-7.
4. ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html
5. ds1-iiith.vlabs.ac.in/exp/poly-arithmetic/index.html

Program:	**B. Tech. (Mechanical/Civil-Minors)**			Semester: **VII**		
Course: Software Engineering				Code: **MIT7991**		
Teaching Scheme				**Evaluation Scheme**		
Lecture	**Tutorial**	**Credit**	**Hours**	**CE**	**ETE**	**Total**
3	-	3	3	50	50	**100**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Understand the software engineering fundamentals.
2. Introduce principles of agile software development, the SCRUM process, and agile practices.
3. Understand project management through the life cycle of the project.
4. Understand current and future trends and practices in the IT industry.

Outcomes:

After learning the course, the students will be able to:

1. Apply software engineering principles to develop software.
2. Analyze software requirements and formulate design solutions for a software.
3. Explain concepts of design engineering , planning and scheduling.
4. Understand risk management and software configuration management.
5. Illustrate software testing strategies.

Detailed Syllabus:

Unit	Description	Duration (Hours)
1	**Software Engineering Fundamentals**: The Nature of Software, Defining Software, Software Engineering Practice. Software Process: A Generic Process Model, defining a Framework Activity, Identifying a Task Set. **Process Models:** Software Process Models, Evolutionary Process Models, Concurrent Model. **Agile software development**: Agile manifesto, agility principles, Agile methods agile development, SCRUM.	**6**
2	**Requirements Engineering:** User and system requirements, Functional and non-functional requirements, requirements engineering (elicitation, specification, validation, negotiation). **Software Requirements Specification (SRS):** software requirements Specification document, structure of SRS, writing a SRS, structured SRS for online shopping. **Requirements Analysis**: Analysis Model, data modeling, scenario based modeling, class based modeling, Flow oriented modeling, behavioral modeling-Introduction to UML diagrams.	**6**

3	**System modeling:** Interaction models, Structural models, Behavioral models, Model-driven engineering. **Design Engineering** : Design Process & quality, Design Concepts, design Model, Pattern-based Software Design. **Design and implementation:** Object-oriented design using the UML.	**6**
4	**Project Planning:** Project initiation, Creating the Work Breakdown Structure. **Scheduling:** Importance of Project Schedules, Developing the Schedule using Gantt Charts, PERT/ CPM. **Project Management:** The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains, Metrics for Project.	**6**
5	**Quality Concepts:** Quality, software quality, Quality Metrics, achieving software quality. **Software Testing:** Principles of Testing, Test plan, Test case, Types of Testing, Verification & Validation, Testing strategies, Defect Management, Defect Life Cycle.	**6**
6	**Project Estimation:** Software Project Estimation, Decomposition Techniques, Cost Estimation Tools and Techniques., Typical Problems with IT Cost Estimates. Case Study : CASE Tools.	**6**
Total	**36**	

Text Books:

1. Ian Sommerville, 'Software Engineering', Addison-Wesley, 9th Edition, 2010, ISBN-13: 978-0137035151.
2. Roger Pressman, "Software Engineering:A Practitioner's Approach", McGraw Hill,ISBN 0-07- 337597-7.

Reference Books:

1. Marchewka, "Information Technology Project Management",Willey India, ISBN: 9788-1265- 4394-6

Program:	**B. Tech. (Mechanical/Civil-Minors)**			Semester: **VII**		
Course: **Database Management Systems (DBMS)**				Code: **MIT7992**		
Teaching Scheme				**Evaluation Scheme**		
Lecture	**Tutorial**	**Credit**	**Hours**	**CE**	**ETE**	**Total**
3	-	3	3	50	50	**100**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Understand the fundamental concepts of database systems.
2. Understand the concept of database design.
3. Learn the foundation of database implementation using SQL.
4. Provide knowledge of transaction processing and concurrency control.

Outcomes:

After learning the course, the students will be able to :

1. Apply fundamental elements of database management systems.
2. Design ER-models to represent simple database application scenarios.
3. Formulate SQL queries on data for relational databases.
4. Remove the duplicate data and database anomalies using normalization.
5. Apply ACID properties for transaction management and concurrency control.
6. Analyze various emerging trends in databases.

Detailed Syllabus

Unit	**Description**	**Duration (Hours)**
1	**Introduction:** Basic concepts, Advantages of DBMS over file processing systems, Data abstraction, Database languages, Data models, Data independence, Components of a DBMS, Overall structure of DBMS, Multi-user DBMS architecture, System catalogs, Codd's Rule.	6
2	**Data Modeling**: Basic concepts, Entity, attributes, relationships, constraints, keys. **Relational Model:** The Entity-Relationship Model, Converting ER diagrams into table & EER Concepts, Data modeling constraints.	6
3	**Introduction to SQL:** Characteristics and advantages SQL Data Types, Literals, DDL, DML, SQL Operators, Views, Indexes, Nulls, Set operations, Aggregate Functions, Nested Queries, Stored Procedure, Triggers, Programmatic, Embedded SQL, ODBC.	6

4	**Relational Databases Design:** Data Redundancy and Insert, update and delete Anomalies, Functional Dependencies, Normalization.	6
5	**Transaction Management:** Basic concept of a Transaction, Properties of Transactions, Database Architecture, Concept of Schedule. **Concurrency Control**: Need, Locking methods, Dead locks, Time stamping Methods.	6
6	**Emerging Trends in databases:** NoSQL databases, Internet Databases, Cloud databases, Mobile Databases, SQLite database, XML databases.	6
	Total	**36**

Text Books:

1. Avi Silberschatz, Henry F. Korth, S. Sudarshan, " Database System Concepts", Seventh Edition, McGraw-Hill,ISBN 9780078022159.
2. G. K. Gupta “Database Management Systems” , Tata McGraw Hill

Program:	**B. Tech. (Mechanical/Civil-Minors)**	Semester: **VII**
Course: **Data Base Management System Laboratory**		**Code: MIT7993**

Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Credit**	**Hours**	**TW**	**Oral**	**PR**	**Total**
--	2	1	2	-	-	25	25

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1.Learn Entity relational diagram (ERD) design notations.
2.Create tables with primary and foreign key.
3.Learn SQL queries using arithmetic and boolean operators.
4.Learn SQL DDL/DML statements.

Outcomes:

After learning the course, the students will be able to :

1. Install and configure MySQL.
2. Study SQLite and install SQLite.
3. Design Entity relational diagram (ER/EER) diagram..
4. Implement SQL tables with primary and foreign key.
5. Execute SQL queries using arithmetic and boolean operators.
6. Execute SQL DDL/DML statements.

Detailed Syllabus:	
Assignment	**Suggested List of Assignments** **Group A (Study Assignments)**
1	Install and configure client and server of MySQL.(Show all commands and necessary steps for installation and configuration).
2	Study of SQLite: What is SQLite?Uses of SQlite. Building and installing SQLite.
Assignment	**Group B (MySQL)**
3	Design any database with at least 3 entities and relationships between them. Draw suitable ER/EER diagram for the system.
4	Design and implement a database (for assignment no 1) using DDL statements and apply normalization on them.
5	Create Table with primary key and foreign key constraints. a. Alter table with add n modify b. Drop table.
6	Perform following SQL queries on the database created in assignment 1. • Implementation of relational operators in SQL • Boolean operators and pattern matching • Arithmetic operations and built in functions • Group functions • Processing Date and Time functions • Complex queries and set operators
7	Execute DDL/DML statements which demonstrate the use of views. Update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables.

Reference Books:

1. Ivan Bayross, “SQL, PL/SQL: The Programming Language of Oracle”, BPB Publication, ISBN10: 8176560723; ISBN-13: 978-8176560726

Program:	**B. Tech. (Mechanical/Civil-Minors)**	Semester: **VIII**
Course: Project		**Code: MIT7991**

Teaching Scheme				**Evaluation Scheme**			
Practical	**Tutorial**	**Credit**	**Hours**	**TW**	**Oral**	**PR**	**Total**
8	-	4	8	50	50	-	**100**

Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge related to:

1. Develop problem solving ability using core computing concepts.
2. Understand basics of IT Project management
3. Develop critical thinking for solving problems using core knowledge of Information Technology.
4. Emphasizes learning activities that are long-term, inter-disciplinary and student-centric.
5. Work in TEAM and learn professionalism.

Outcomes:

After learning the course, the students will be able to:

1. Develop projects applying object oriented concepts.
2. Practice acquired knowledge within the chosen area of technology for project development.
3. Organize and Maintain large collection of related data.
4. Organize information in digital space.

General Guidelines for Project Work

Project is one of the significant contributory team works that has to be completed based on the required number of credits as per academic regulations. It is necessary to explore the domain of interest / research/ thrust area/ society needs.

1. **Project teams:** 3-4 students can form a team within the same or different discipline and their area of interest is to be registered with project Coordinator.
2. **Selection of Project**: a. Student shall identify the area or topics based on the knowledge they gain from all the courses offered to them.
3. **Guide Allotment:**
   a. Considering registered teams area of interest/domain and expertise of guide, the Project coordinator in consultation with panel of experts allots Project guides.
   b. Guide should be allotted from the same program.
4. **Project Review:**
   a. The Project coordinator with the Head of the department shall constitute a review committee for project

groups.

b. A review committee will approve the project group and title.

c. The Project Review committee will evaluate the timely progress of the projects.

6. Report:

a. Report should be prepared using Word/Latex only as per the template provided by the department.

b. Project reports shall be submitted in softcopy and hardcopy form (Hard bound reports could be avoided).

Project Presentation

The evaluation will be based on the following criteria:

1. Depth of knowledge and skills
2. Communication & presentation Skills
3. Team work and creativity
4. Planning & organizational skills
5. Societal understanding and Ethics
6. Regularity and punctuality
7. Attendance record

Project Work Evaluation:

Review 1: -

Deliverables:

1. The precise problem statement/title based on literature survey and feasibility study.
2. Purpose, objectives and scope of the project.
3. List of required hardware, software or other equipment for executing the project, test Environment/tools, cost and human efforts in hours.
4. System overview- proposed system and proposed outcomes.
5. Architecture and initial phase of design (DFD).
6. Project plan 1.0.

Review 2: –

Deliverables:

1. SRS and High level design
2. Detail architecture/System design/algorithms/techniques
3. Complete Project and Testing
4. Project plan 2.0

Report

Project reports shall be submitted in softcopy form/ (Hard bound reports could be avoided).

The project report contains the details.

1. Problem definition
2. Requirement specification
3. System design details (UML diagrams)
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocols used.
5. Test result and procedure
6. Conclusions.
7. Appendix

a. Tools used
b. References
c. Papers published/certificates
d. Plagiarism Report of paper and project report from any open source tool

Credit distributions

1. TW- Review, presentation Report, project competitions, and deliverables
2. Oral- presentation, project execution [with external examiner