Shri G.S. Institute of Technology & Science, Indore

Department of Computer Engineering

Minutes of Meeting of Board of Studies in Computer Engineering held on 06/06/23

A meeting of Board of Studies (BoS) in Computer Engineering was held on Tuesday, 06/06/23 at 3 p.m.in hybrid online-offline mode. The meeting was available on Google Meet platform.

Following members attended the meeting:

1.	Dr. Vandan Tewari, Professor & Head, Department of Computer Engineering)	(Chairperson)
2.	Dr. Aruna Tiwari, Professor, Department of Computer Engineering, IIT, Indore	(Member, External Expert)
3.	Mr. V. R. Sathe, IT Cosultant	(Member, External Expert)
4.	Prof. D.A. Mehta, Professor, , Department of Computer Engineering	(Member)
5.	Dr. Urjita Thakar, Professor, Department of Computer Engineering	(Member)
6.	Dr. Anuradha Purohit, Professor, Department of Computer Engineering	(Member)
7.	Mr. Surendra Gupta, Associate Professor, Department of Computer Engineering	(Member)
8.	Mr. Rajesh Dhakad, Associate Professor, Department of Computer Engineering	(Member)
9.	Ms. Priyanka Bamne, Assistant Professor, Department of Computer Engineering	(Member)
10.	Ms. Neha Mehra, Assistant Professor, Department of Computer Engineering	(Member)

Dr. U.A. Deshpande, (Professor, Computer Engineering, VNIT, Nagpur), Prof. D.S. Jinwala, (Professor, Computer Engineering, SVNIT, Surat) and Sh. J.K. Khatwani (Principle Engineer, The Modern Data Company) could not attend the meeting.

Discussions were held on all the agenda items. Following are the deliberations:

Item no 1: Review of Vision & Mission statements of department

The mission and vision of Department was presented and the change as suggested in DPAQIC meeting held on 16/05/23 was accepted by the BoS. The Vision is now stated as:

- To become a centre of excellence for creating competent human resource in the field of Computer Science and Engineering meeting the dynamic societal and industrial needs.

Item no 2: To review the scheme and syllabi of B.Tech. (Computer Sc. & Engg.)

The scheme and syllabi of B.Tech. program were discussed. Following are the recommendations:

I Year B. Tech.

The course "CO10507: Programming for Problem Solving" is offered to the students of all engineering branches. Modification (<15%) in syllabus has been recommended to make the content more generalized. This will be applicable to students admitted in year 2023 and onwards. Old and modified syllabii are enclosed.

II Year B.Tech.

No changes in scheme were recommended.

III Year B.Tech.

Modification in syllabus (<15%) of subject CO34554: Foundation of Information Security has been recommended. Old and modified syllabii are enclosed.

IV Year B.Tech.

(i) The scheme of VII semester B.Tech. Computer Science & Engineering was reviewed and it was recommended that the lab component from Elective II and Elective III be removed and an independent Lab course "CO_____: Product Development & QA Workshop" be added.

(ii) Modification in Syllabi (<15%) of CO44242: Cloud Computing has been recommended. Old and modified syllabii is enclosed.

(iii) New Elective ccurse CO_____: Software Testing be added to list of subjects of Elective-IV. Syllabus is enclosed.

(iv) Subject CO_____: Natural language Processing be shifted from Elective VI to list of subjects of Elective IV. with the same syllabus.

All the changes will be applicable to students enrolling in VII Sem. B. Tech. in Session 2023-24. The old and new schemes are enclosed.

Item no 3: To review the scheme and syllabi of M.Tech. (Computer Engg.)

Modification (<15%) in syllabus of CO71764: Data Science & Analytics has been recommended. Old and modified syllabus are enclosed.

Any other Item : Under this item no discussion took place.

The meeting ended with vote of thanks to the Chair.

Signatures of members:-

1.	Dr. Vandan Tewari	(Chairperson)
2.	Mr. V.R. Sathe	(External Expert)
3.	Dr. Aruna Tiwari	(External Expert)
4.	Prof. D. A. Mehta	(Member)
5.	Dr. Urjita Thakar	(Member)
6.	Dr. Anuradha Purohit	(Member)
7.	Mr. Surendra Gupta	(Member)
8.	Mr. Rajesh Dhakad	(Member)
9.	Ms. Priyanka Bamne	(Member)
10.	Ms. Neha Mehra	(Member)

NEW

DEPARTMENT OF COMPUTER ENGINEERING
B. Tech. I YEAR (4YDC)
CO 10507: PROGRAMMING FOR PROBLEM SOLVING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	1	-	3	-	70	30	-	-	100

PRE-REQUISITES: NIL

COURSE OBJECTIVES: This course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language.

COURSE OUTCOMES:
After completing the course student should be able to:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs and test and execute the programs and correct syntax and logical errors.
3. To apply programming to solve conditional and iterative statement, function, recursion, and arrays.
4. To use pointers and structures to formulate algorithms and programs. To use the concepts of OOPS.

COURSE CONTENTS:
THEORY:

Unit	Topics	CO
UNIT 1	Block Schematic of digital computer and it's working. Introduction to computer hardware and software, Flowchart and algorithm.Structure of C programs, key words and identifiers, constants, variables and memory representation, Data types, Declarations, scope and life of variables.	CO1
UNIT 2	Various types of operators and expressions. Operator precedence and associativity. Programming errors and their handling. Data type conversion and promotion, Decision making and Branching: if-else, switch-case. Use of break, continue, default.	CO1, CO2
UNIT 3	Use of looping: While-do, for, do-while etc., nesting of loops. Functions and Recursive functions.	CO2, CO3
UNIT 4	Introduction and use of array, multidimensional array, character array, strings, structure, union, pointers and Files in the programming.	CO3, CO4
UNIT 5	Introduction to Object oriented Programming paradigm, Comparison of Procedural and Object Oriented Programming paradigm. OOPS concept: Class, object, inheritance, polymorphism, Overloading vs. Overriding etc.	CO4

COURSE ASSESMENT (Th.):

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED:

1. E. Balagurusamy, "Programming in ANSI C", Sevenths Edition, Tata McGraw Hill, 2017.
2. ReemaThareja , "Programming in C", Second Edition , Oxford publication, 2016
3. W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson , 2015

REFERENCE BOOKS:

1. Matthias Felleisen, Robert BruceFindler , Mathew Flatt, ShriramKrishnamurthi, "How to Design Programs: An Introduction to Programming and Computing", Second Edition, MIT Press, 2018.
2. M.Chandwani, A. Jain and N.S. Chaudhary, " Elements of Computer Science" , Jain Publishers 1997
3. E. Balagurusamy, " Object Oriented Programming with C++", Tata McGraw Hill, 2009
4. B.S. Gottfried, "Programming with C", 3rd edition, Tata McGraw Hill, 2018
5. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.

Mapping of Course Outcomes with Program Outcomes

Statement of CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average Target CO Attainment
CO1	3	3	2	1	2				1		1		1.86
CO2	3	3	2	1	2				1		1		1.86
CO3	3	3	3	2	2				1		1		2.14
CO4	3	3	3	2	2				1		1		2.14
Average Target	3	3	2.5	1.5	2				1		1		2

OLD

DEPARTMENT OF COMPUTER ENGINEERING
B. E. I YEAR (4YDC)
CO 10507: PROGRAMMING FOR PROBLEM SOLVING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	1	-	3	-	70	30	-	-	100

PRE-REQUISITES: NIL

COURSE OBJECTIVES: This course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language.

COURSE OUTCOMES:
After completing the course student should be able to:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs and test and execute the programs and correct syntax and logical errors.
3. To apply programming to solve conditional and iterative statement, function, recursion, and arrays.
4. To use pointers and structures to formulate algorithms and programs. To use the concepts of OOPS.

COURSE CONTENTS:
THEORY:

Unit	Topics	CO
UNIT 1	Block Schematic of digital computer and it's working. Introduction to computer hardware and software. Flowchart and algorithm. Structure of C program, key words and identifiers, constants, variables and memory representation. Data types, enumerated data types. Declarations, scope and life of variables.	CO1
UNIT 2	Various types of operators and expressions.Operator precedence and associativity. Programming errors and their handling. Data type conversion and promotion. Storage classes. Decision making and Branching: if-else, switch-case. Use of break, continue, default and exit.	CO1, CO2
UNIT 3	Use of looping: While-do, for, do-while etc., nesting of loops. Introduction to functions, ~~functions with array, passing parameters to functions, call by value, call by reference,~~ recursive functions. ~~Standard C preprocessors, defining and calling macros, command-line arguments.~~	
UNIT 4	Introduction to Arrays~~: Array notation and representation, manipulating array elements;~~ Character arrays and strings, multidimensional array~~; Structures:~~ Structure, and union~~, nesting of structures, structure passing in function, Array of structures;~~ Pointers~~: declaration, applications, Introduction to dynamic~~	CO3, CO4

	memory allocation. Use of pointers in self-referential structures: Files: File I/O functions:	
UNIT 5	Introduction to Object oriented Programming paradigm, Comparison of Procedural and Object Oriented Programming paradigm. Programming with C++ using OO concept: Class, object, constructors, inheritance, polymorphism, Overloading vs. overriding etc.	CO4

COURSE ASSESMENT (Th.):

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).ss
2. End semester Theory Exam (70%).

TEXT BOOKS RECOMMENDED:

1. E. Balagurusamy, "Programming in ANSI C", Sevenths Edition, Tata McGraw Hill, 2017.
2. ReemaThareja , "Programming in C", Second Edition , Oxford publication, 2016
3. W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson , 2015

REFERENCE BOOKS:

1. Matthias Felleisen, Robert BruceFindler , Mathew Flatt, ShriramKrishnamurthi, "How to Design Programs: An Introduction to Programming and Computing", Second Edition, MIT Press, 2018.
2. M.Chandwani, A. Jain and N.S. Chaudhary, " Elements of Computer Science" , Jain Publishers 1997
3. E. Balagurusamy, " Object Oriented Programming with C++", Tata McGraw Hill, 2009
4. B.S. Gottfried, "Programming with C", 3rd edition, Tata McGraw Hill, 2018
5. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.

Mapping of Course Outcomes with Program Outcomes

Statement of CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average Target CO Attainment
CO1	3	3	2	1	2				1		1		1.86
CO2	3	3	2	1	2				1		1		1.86
CO3	3	3	3	2	2				1		1		2.14
CO4	3	3	3	2	2				1		1		2.14
Average Target	3	3	2.5	1.5	2				1		1		2

NEW

DEPARTMENT OF COMPUTER ENGINEERING
B. Tech. I YEAR (4YDC)
CO 10654: Computer Programming Lab

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	20	30	50

PRE-REQUISITES: NIL

COURSE OBJECTIVES: This course aims to provide basic principles of C programming language. It aims to provide design & develop of C programming skills, which gives the student hands-on experience with the concepts.

COURSE OUTCOMES:

After completing the course student should be able to:

1. List linux command and editing tools and Develop C programs to solve simple mathematical and decision making problems.
2. Develop C programs to solve simple engineering problems using looping constructs.
3. Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions, recursion.
4. Develop C programs to demonstrate the use of Structures and Files

S. No.	LIST OF EXPERIMENTS	CO
Lab 1	Hands-on the Linux Commands: cd, cmp, cat, ls, man, mkdir, mv, passwd, pwd, rm, rmdir, cp Hands-on the Editing tools: vi/gedit/nano/touch	CO1
Lab 2	Develop C program using I/O statements, operators and expressions	CO1
Lab 3	Develop C program using decision-making and branching constructs: if-else, switch-case, break, default.	CO1
Lab 4	Develop C program using Loops: for, while, do-while, nesting of loops, break-continue, exit.	CO2
Lab 5	Develop C program using Arrays: 1D.	CO3
Lab 6	Develop C program using Arrays: 2D, Multi-dimensional arrays, traversal	
Lab 7	Develop C program using Strings: operations	CO3
Lab 8	Develop C program using Functions: call, return, passing parameters by (value, reference), passing arrays to function	CO3
Lab 9	Formulate program using Recursion	CO3
Lab 10	Develop C program using Pointers: Pointers to functions, Pointers to Arrays, Pointers to Strings, Pointers to Pointers, Array of Pointers	CO3
Lab 11	Develop C program using Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.	CO4
Lab 12	Develop C program Files: reading and writing, File pointers file operations, random access.	CO4

COURSE ASSESMENT (Pr.):

1. Internal Assessment for continuous evaluation (40%): Lab assignments, Demonstration, Quiz, Viva, file etc.
2. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.

TEXT BOOKS RECOMMENDED:

1. E. Balagurusamy, "Programming in ANSI C", Sevenths Edition, Tata McGraw Hill, 2017.
2. ReemaThareja , "Programming in C", Second Edition , Oxford publication, 2016

REFERENCE BOOKS:

1. Matthias Felleisen, Robert BruceFindler , Mathew Flatt, ShriramKrishnamurthi, "How to Design Programs: An Introduction to Programming and Computing", Second Edition, MIT Press, 2018.
2. E. Balagurusamy, " Object Oriented Programming with C++", Tata McGraw Hill, 2009
3. B.S. Gottfried, "Programming with C", 3rd edition, Tata McGraw Hill, 2018

Mapping of Course Outcomes with Program Outcomes

Statement of CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average Target CO Attainment
CO1	3	3	2	1	2				1		1		1.86
CO2	3	3	2	1	2				1		1		1.86
CO3	3	3	3	2	2				1		1		2.14
CO4	3	3	3	2	2				1		1		2.14
Average Target	3	3	2.5	1.5	2				1		1		2

OLD

DEPARTMENT OF COMPUTER ENGINEERING

B. E. I YEAR (4YDC)
CO 10654: Computer Programming Lab

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	20	30	50

PRE-REQUISITES: NIL

COURSE OBJECTIVES: This course aims to provide basic principles of C programming language. It aims to provide design & develop of C programming skills, which gives the student hands-on experience with the concepts.

COURSE OUTCOMES:

After completing the course student should be able to:

1. List linux command and editing tools and Develop C programs to solve simple mathematical and decision making problems.
2. Develop C programs to solve simple engineering problems using looping constructs.
3. Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions, recursion.
4. To use Structures, Files, and ~~OOPS concepts to~~ formulate algorithms and programs.

S. No.	LIST OF EXPERIMENTS	CO
Lab 1	Hands-on the Linux Commands: cd, cmp, cat, ls, man, mkdir, mv, passwd, pwd, rm, rmdir, cp Hands-on the Editing tools: vi/gedit/nano/touch	CO1
Lab 2	Develop C program using I/O statements, operators and expressions	CO1
Lab 3	Develop C program using decision-making and branching constructs: if-else, switch-case, break, default.	CO1
Lab 4	Develop C program using Loops: for, while, do-while, nesting of loops, break-continue, exit.	CO2
Lab 5	Develop C program using Arrays: 1D and 2D, Multi-dimensional arrays, traversal	CO3
Lab 6	Develop C program using Strings: operations	CO3
Lab 7	Develop C program using Functions: call, return, passing parameters by (value, reference), passing arrays to function	CO3
Lab 8	Formulate program using Recursion	CO3
Lab 9	Develop C program using Pointers: Pointers to functions, Pointers to Arrays, Pointers to Strings, Pointers to Pointers, Array of Pointers	CO3
Lab 10	Develop C program using Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.	CO4
Lab 11	Develop C program Files: reading and writing, File pointers, file operations, random access.	CO4
Lab 12	~~Develop C++ program using OOPS concepts.~~	CO4

COURSE ASSESMENT (Pr.):

1. Internal Assessment for continuous evaluation (40%): Lab assignments, Demonstration, Quiz, Viva, file etc.
2. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.

TEXT BOOKS RECOMMENDED:

1. E. Balagurusamy, "Programming in ANSI C", Sevenths Edition, Tata McGraw Hill, 2017.
2. ReemaThareja , "Programming in C", Second Edition , Oxford publication, 2016

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1. Matthias Felleisen, Robert BruceFindler , Mathew Flatt, ShriramKrishnamurthi, "How to Design Programs: An Introduction to Programming and Computing", Second Edition, MIT Press, 2018.
2. E. Balagurusamy, " Object Oriented Programming with C++", Tata McGraw Hill, 2009
3. B.S. Gottfried, "Programming with C", 3rd edition, Tata McGraw Hill, 2018

Mapping of Course Outcomes with Program Outcomes

Statement of CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average Target CO Attainment
CO1	3	3	2	1	2				1		1		1.86
CO2	3	3	2	1	2				1		1		1.86
CO3	3	3	3	2	2				1		1		2.14
CO4	3	3	3	2	2				1		1		2.14
Average Target	3	3	2.5	1.5	2				1		1		2

NEW

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO 34554: FOUNDATION OF INFORMATION SECURITY

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	-	-	100

PRE-REQUISITES: CO34007:Computer Network

COURSE OBJECTIVES:

COURSE OUTCOMES:

After completing the course student should be able to:

1. ***Analyze and model the Symmetric cryptographic algorithms for information security***
2. ***Model the Public Key cryptosystems***
3. ***Understand how to apply access control techniques to authenticate the data***
4. ***Apply concepts of Email, IP and web security in application development.***

COURSE CONTENTS:

THEORY:

UNIT 1 Introduction: Needs for Security; Basic security terminologies e.g. threats, vulnerability, exploit etc.; Security principles(CIA), authentication, nonrepudiation; security attacks and their classifications; Mathematical foundation - Prime Number; Modular Arithmetic; Fermat's and Euler's Theorem; The Euclidean Algorithms; The Chinese Remainder Theorem; Discrete logarithms.

UNIT 2 Symmetric Key Cryptography: Classical cryptography – substitution, transposition and their cryptanalysis; Symmetric Cryptography Algorithm – DES, 3DES, AES etc.; Modes of operation: ECB, CBC etc.; Cryptanalysis of Symmetric Key Ciphers: Linear Cryptanalysis. Differential Cryptanalysis.

UNIT 3 Asymmetric Key Cryptography: Key Distribution and Management, Diffie-Hellman Key Exchange algorithm; Asymmetric Key Cryptography Algorithm– RSA, ECC etc.; Various types of attacks on Cryptosystems.

UNIT 4 Authentication & Integrity – MAC, Hash function, SHA, MD5, HMAC, Digital signature and authentication protocols; Authorization; Access control mechanism; X.509 Digital Certificate.

UNIT 5 E-mail, IP and Web Security: E-mail security – PGP, MIME, S/MIME; IP security protocols; Web security – TLS, SSL etc.; Secure Electronic Transaction(SET); Firewall and its types; Introduction to IDPS; Risk Management; Security Planning.

DIRECT ASSESMENT:

ASSESMENT OF THEORY-

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

INDIRECT ASSESMENT:

1. Feedback of students on attainment of cos.
2. Feedback of students on classroom learning.
3. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", 6th Edition, Cengage Learning.
2. Stallings William, "Cryptography and Network Security - Principles and Practice", 7th Edition, Pearson.

REFERENCE BOOKS:

1. Roberta Bragge, Mark Rhodes, Keith Straggberg, "Network Security the Complete Reference", Tata McGraw Hill Publication.

V.R.S. BE

OLD

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO 34554: FOUNDATION OF INFORMATION SECURITY

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	-	-	100

PRE-REQUISITES: CO34007:Computer Network

COURSE OBJECTIVES:

COURSE OUTCOMES:

After completing the course student should be able to:

1. Explain the concepts related to classical cryptography, symmetric cryptography and asymmetric cryptography.
2. Identify common network vulnerabilities and attacks, and their defence mechanism.
3. Apply concepts of Email, IP and web security in application development.
4. Summarize the concepts of security in various types of organizations.

COURSE CONTENTS:

THEORY:

UNIT 1 Introduction: Needs for Security; Basic security terminologies e.g. threats, vulnerability, exploit etc.; Security principles(CIA), authentication, nonrepudiation; security attacks and their classifications; Mathematical foundation - Prime Number; Modular Arithmetic; Fermat's and Euler's Theorem; The Euclidean Algorithms; The Chinese Remainder Theorem; Discrete logarithms.

UNIT 2 Symmetric Key Cryptography: Classical cryptography – substitution, transposition and their cryptanalysis; Symmetric Cryptography Algorithm – DES, 3DES, AES etc.; Modes of operation: ECB, CBC etc.; Cryptanalysis of Symmetric Key Ciphers: Linear Cryptanalysis, Differential Cryptanalysis.

UNIT 3 Asymmetric Key Cryptography: Key Distribution and Management, Diffie-Hellman Key Exchange algorithm; Asymmetric Key Cryptography Algorithm– RSA, ECC etc.; Various types of attacks on Cryptosystems.

UNIT 4 Authentication & Integrity – MAC, Hash function, SHA, MD5, HMAC, Digital signature and authentication protocols; Authorization; Access control mechanism; X.509 Digital Certificate.

UNIT 5 E-mail, IP and Web Security: E-mail security – PGP, MIME, S/MIME; IP security protocols; Web security – TLS, SSL etc.; Secure Electronic Transaction(SET); Firewall and its types; Introduction to IDPS; Risk Management; Security Planning.

DIRECT ASSESMENT:

ASSESMENT OF THEORY-

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

INDIRECT ASSESMENT:

1. Feedback of students on attainment of cos.
2. Feedback of students on classroom learning.
3. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", 6th Edition, Cengage Learning.
2. Stallings William, "Cryptography and Network Security - Principles and Practice", 7th Edition, Pearson.

REFERENCE BOOKS:

1. Roberta Bragge, Mark Rhodes, Keith Straggberg, "Network Security the Complete Reference", Tata McGraw Hill Publication.

NEW

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 44242: CLOUD COMPUTING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	-	-	70	30	40	60	200

PRE-REQUISITES: CO34007: Computer Network

COURSE OBJECTIVES: Students will be able to understand the concept of service oriented architecture and gain knowledge of various cloud service model, deployment model, types of virtualization. Get detailed knowledge about cloud resource management and security issues.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe the fundamentals of cloud computing and different types of service models and deployment models.
2. Explain the importance of virtualization and differentiate various types of hypervisors.
3. ***Analyze authentication, confidentiality and privacy issues in Cloud computing environment.***
4. ***Compare operation and economic models of various trending cloud platforms prevailing in the IT industry.***

COURSE CONTENTS:

THEORY:

UNIT 1 Introduction to Service Oriented Architecture, RESTful services: Introduction to cloud computing: Definition, Characteristics, cloud services , Types; Software as a Service, Platform as a Service, Infrastructure as Service, Deployment model , Architecture of cloud computing , Application, benefits and limitations, basic technologies of cloud computing, Multi-tenancy and scalabilty

UNIT 2 Study concept of Virtualization, characteristics, Virtualization applications in enterprises, Pitfalls of virtualization, reference model of virtualization, Study about Hypervisor, types of hypervisor, case study of hypervisors.

UNIT 3 Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Features and comparisons among GFS, HDFS etc, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The Map-Reduce model: Parallel efficiency of Map-Reduce, Relational operations, Enterprise batch processing. Example/Application of Map-Reduce.

UNIT 4 Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture, General Issues, Trusted Cloud computing, Security challenges: Virtualization security management-virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT 5 Issues in cloud computing; implementing real time application; QOS Issues in Cloud,

Dependability, data migration, streaming in Cloud. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, Resource optimization, Resource dynamic reconfiguration, Monitoring in Cloud, Installing cloud platforms and performance evaluation, Features and functions of cloud computing platforms.

DIRECT ASSESMENT:

ASSESMENT OF THEORY-

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

ASSESSMENT OF PRACTICAL:

1. Internal Assessment for continuous evaluation (40%): Lab assignments, demonstration, Viva, File etc.
2. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.

INDIRECT ASSESMENT:

1. Feedback of students on attainment of cos.
2. Feedback of students on classroom learning.
3. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. George-Coulouris, " Distributed-Systems-Concepts-and-Design-5th-Edition", Addison-Wesley, 2012
2. Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
3. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, "Cloud Computing for Dummies", Wiley India Edition
4. RajkumarBuyya, Christian Vecchiola, S. Thamaraselvi, Mastering Cloud Computing, McGraw Hill, 2013

REFERENCE BOOKS:

1. Scott Granneman, "Google Apps", Pearson, 2012
2. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O'REILLY
3. Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2011

RESEARCH JOURNALS:

1. Scott Granneman, "Google Apps", Pearson, 2012
2. Tim Malhar, S. Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O'REILLY
3. 3.Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2011

OLD

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 44242: CLOUD COMPUTING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	-	-	70	30	40	60	200

PRE-REQUISITES: CO34007: Computer Network

COURSE OBJECTIVES: Students will be able to understand the concept of service oriented architecture and gain knowledge of various cloud service model, deployment model, types of virtualization. Get detailed knowledge about cloud resource management and security issues.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe the fundamentals of cloud computing and different types of service models and deployment models.
2. Explain the importance of virtualization and differentiate various types of hypervisors.
3. Compare and contrast different cloud file systems and demonstrate working of map reduce model.
4. Evaluate the performance of cloud computing and analyze security and resource optimization issues related to cloud computing environment.

COURSE CONTENTS:

THEORY:

UNIT 1 Introduction to Service Oriented Architecture, RESTful services: Introduction to cloud computing: Definition, Characteristics, cloud services , Types; Software as a Service, Platform as a Service, Infrastructure as Service, Deployment model , Architecture of cloud computing , Application, benefits and limitations, basic technologies of cloud computing, Multi-tenancy and scalabilty

UNIT 2 Study concept of Virtualization, characteristics, Virtualization applications in enterprises, Pitfalls of virtualization, reference model of virtualization, Study about Hypervisor, types of hypervisor, case study of hypervisors.

UNIT 3 Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Features and comparisons among GFS, HDFS etc, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The Map-Reduce model: Parallel efficiency of Map-Reduce, Relational operations, Enterprise batch processing, Example/Application of Map-Reduce.

UNIT 4 Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture, General Issues, Trusted Cloud computing, Security challenges: Virtualization security management-virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT 5 Issues in cloud computing; implementing real time application; QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds. Sky computing, load balancing. Resource optimization, Resource dynamic reconfiguration. Monitoring in Cloud. Installing cloud platforms and performance evaluation, Features and functions of cloud computing platforms.

DIRECT ASSESMENT:

ASSESMENT OF THEORY-

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

ASSESSMENT OF PRACTICAL:

3. Internal Assessment for continuous evaluation (40%): Lab assignments, demonstration, Viva, File etc.
4. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.

INDIRECT ASSESMENT:

5. Feedback of students on attainment of cos.
6. Feedback of students on classroom learning.
7. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. George-Coulouris, " Distributed-Systems-Concepts-and-Design-5th-Edition", Addison-Wesley. 2012
2. Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
3. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, "Cloud Computing for Dummies", Wiley India Edition
4. RajkumarBuyya, Christian Vecchiola, S. Thamaraselvi, Mastering Cloud Computing, McGraw Hill. 2013

REFERENCE BOOKS:

1. Scott Granneman, "Google Apps", Pearson, 2012
2. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O'REILLY
3. Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2011

RESEARCH JOURNALS:

1. Scott Granneman, "Google Apps", Pearson, 2012
2. Tim Malhar, S. Kumaraswammy, S.Latif, "Cloud Security & Privacy", SPD, O'REILLY
3. 3.Ronald Krutz and Russell Dean Vines, "Cloud Security", Wiley-India, 2011

NEW

DEPARTMENT OF COMPUTER ENGINEERING

B.TECH. IV YEAR (4YDC)

SEMESTER-A (ELECTIVE-4)

CO 4___: SOFTWARE TESTING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	40	60	200

Pre-requisites: Programming, Algorithms, Discrete Mathematics (basics).

Course Objective:

1. To introduce fundamental concepts of Software Testing.
2. To enable understanding of various effective testing techniques for ensuring high quality software.

Course Outcomes:

1. Analyze and understand the use of software testing methods and modern software testing tools.
2. Design a software test process for a software testing project.
3. Make use of software testing methods and modern software testing tools for the testing projects.
4. Apply testing techniques to test object oriented applications, web applications and other domain projects.

Course Contents:

Unit-1: Introduction to Software Testing, Basic Terminologies, Testing based on Models and Criteria, Tools for Automated Testing; Techniques and algorithms for test case design, Graph Based Testing: Basics, Structural Graph Coverage Criteria & Algorithms, Elementary Graph Algorithms, Data Flow Graph Algorithms, Testing Source Code.

Unit-2: Graphs coverage for source code, design elements and requirements: Software Design and Integration Testing, Design Integration Testing, Specification Testing, Finite state Machines, Basics Needed for Software Testing.

Unit-3: Logic Based Testing: Coverage Criteria, Logic Coverage Criteria for Test Code and its issues, Specification based logic coverage, logic coverage on finite state machines.

Unit-4: Functional Testing, Input Space Partitioning: Coverage Criteria and Examples, Syntax-Based Testing; Mutation Testing: Introduction, Mutation Testing vs. Graphs and Logic Based Testing, Mutation for integration.

Unit-5: Testing of Web Applications and Web Services, Testing of Object-Oriented Applications, Testing of Mobile Applications, Symbolic Testing, DART: Directed Automated Random Testing, Non-Functional System Testing, Regression Testing.

Text Books:

1. Mauro Pezze and Michal Young, Software Testing and Analysis: Process, Principles, and Techniques, Willey.
2. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing: Principles and Practices, Pearson Education.
3. Desai Sandeep and Srivastava Abhishek, Software Testing: A Practical Approach, PHI.

e-Resources:

1. Software Testing Course on NPTEL, https://onlinecourses.nptel.ac.in/noc19_cs71/preview.

B.Tech. IV YEAR (4YDC)
Semester -A (ELECTIVE-IV)
CO_____: NATURAL LANGUAGE PROCESSING
(Passed in B.o.S on 06/06/23 to be added in list of Electives w.e.f 2020-Enterants)

2023-24 for Students entering IV Yr. in session 2023-24 onwards

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	40	60	200

Course Objective: To enable a student in understanding and applying basics of NLP, covering standard frameworks for dealing with natural language as well as algorithms and techniques to solve various NLP problems in field of machine learning.

Pre Requisites:

1. Knowledge of probability, linear algebra, multivariate calculus.
2. Proficiency in Python: Python, Numpy and PyTorch libraries.

Course Outcomes: After Completing this course, student will be able to:

CO1: Identify the basic models of text processing and will be able to perform PoS tagging

CO2: Select and implement sequential tagging techniques that are suitable for the applications under consideration.

CO3 :Solve problems associated withDistributional Semantics, Lexical Semantics

CO4: Apply and implement text mining algorithms and comprehend sentiment Analysis.

Syllabus

UNIT1. Introduction and Basic Text Processing, Spelling Correction, Language Modeling, Advanced smoothing for language modeling, POS tagging

UNIT2. Models for Sequential tagging – MaxEnt, CRF , Syntax – Constituency Parsing , Dependency Parsing

UNIT3. Distributional Semantics, Lexical Semantics, Topic Models

UNIT4. Entity Linking, Information Extraction , Text Summarization, Text Classification

UNIT5. Sentiment Analysis and Opinion Mining

Text Books:

1. Dan Jurafsky and James Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall, Second Edition, 2009. Some draft chapters of the third edition are available online: https://web.stanford.edu/~jurafsky/slp3/
2. Chris Manning and HinrichSchütze. Foundations of Statistical Natural Language Processing. MIT Press.

Reference Books:

1. NitinIndurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.

2. James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012.

3. Hobson lane, Cole Howard, Hannes Hapke, "Natural language processing in action" MANNING Publications, 2019.

4. Alexander Clark, Chris Fox, Shalom Lappin, "The Handbook of Computational Linguistics and Natural Language Processing", Wiley-Blackwell, 2012

Web Resources:

1. https://github.com/keon/awesome-nlp
2. https://github.com/khanhnamle1994/natural-language-processing
3. https://github.com/joosthub/PyTorchNLPBook

NPTEL Courses:

1.https://archive.nptel.ac.in/courses/106/105/106105158/

DEPARTMENT OF COMPUTER ENGINEERING
M. TECH. I YEAR (2YDC)
SEMESTER-B (ELECTIVE-IV)
CO 71764: DATA SCIENCE & ANALYTICS

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
4	-	-	5	-	70	30	-	-	100

Course Objective:
To enable students to understand data and analyze data for various learning algorithms.

Course Outcomes:

After completion of this course, student should be able to

CO1: Build mathematical foundation for data analysis
CO2: Understand data and its characteristics
CO3: Visualize and pre-process the data as per requirement
CO4: Design and analyse data models

COURSE CONTENTS:

THEORY:

UNIT 1 Mathematical Foundation : Matrix Algebra, Vector Algebra, Statistics-Frequencies and the Mode, Percentiles, Probability, linear programming, Introduction to contemporary tools and programming languages like R, Python etc. for data analysis.

Unit 2 Understanding Data: Types of data, Data Quality- Measurement and Data Collection Issues, Measures of Similarity and Dissimilarity, Similarity and Dissimilarity between Simple Attributes, Dissimilarities between Data Objects, Similarities between Data Objects Examples of Proximity Measure Data Distributions

UNIT 3 Data Pre-processing: Data Transformation & Cleaning, Aggregation, Sampling, Dimensionality reduction, Feature subset Selection, feature creation, PCA, LDA, SVD, Discretization & Binarization, variable transformation, Data Normalization, Data similarity measures, missing values, filters, Wrapper Method ,Noise reduction techniques. Introduction to Web Search & Big Data

UNIT 4 Statistical analysis- Measures of Location- Mean and Median, Measures of Spread: Range and Variance, Multivariate Summary Statistics, Data Visualization: boxplots, histograms, scatterplots, features map visualization, OLAP & Multidimensional Data Analysis. Introduction to Information Retrieval.

UNIT 5 Classification: Decision Tree induction, Rule based Classification, Nearest Neighbour Classification, Correlation & Regression analysis, Linear Regression, logistic regression, Performance metrics, evaluating performance, types of errors, Training & Testing data: Overfitting & Under fitting, Clustering: K Means Clustering.

ASSESSMENT:

DIRECT ASSESMENT:

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

INDIRECT ASSESMENT:

1. Feedback of students on attainment of COs.
2. Feedback of students on classroom learning. 3. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. Pang Ning Tan , Michael Steinbach , Vipin Kumar, Introduction to Data Mining, Pearson, Addison Wesley
2. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, 3rd Edition, Morgan Kauffman Publishers.

REFERENCE BOOKS RECOMMENDED:

1. Field Cady, "The Data Science Handbook" , 1/e ,2018,Publisher: Wiley.
2. Sinan Ozdemir, "Principles of Data Science ", 1/e, 2016Packt Publishing Limited
3. Peter Bruce, "Practical Statistics for Data Scientists: 50 Essential Concepts",Shroff/O'Reilly; First edition (2017).

RESEARCH JOURNALS:

1. International Journal of Data Science and Analytics.
2. ACM Transactions on Knowledge Discovery in Data (TKDD).
3. Data Mining and Knowledge Discovery journal.
4. The International Journal Advances in Data Analysis And Classification.

Old

DEPARTMENT OF COMPUTER ENGINEERING

M. TECH. I YEAR (2YDC)

SEMESTER-B (ELECTIVE-IV)

CO 71764: DATA SCIENCE & ANALYTICS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3			3		70	30	-	-	100

PRE-REQUISITES: Basics of statistics.

COURSE OBJECTIVES: To enable students to understand data and analyze data for various learning algorithms.

COURSE OUTCOMES: After completing the course student should be able to:

1. Identify the characteristics of datasets and visualize the data.
2. Select and implement data preprocessing techniques that are suitable for the applications under consideration.
3. Solve problems associated with data characteristics such as high dimensionality, dynamically growing data
4. Apply and implement text mining algorithms and comprehend big data analytics.

COURSE CONTENTS:

THEORY:

UNIT 1 Data Wrangling and Exploratory Analysis, Data Transformation & Cleaning, Feature Extraction, Data Visualization. Introduction to contemporary tools and programming languages like R, Python etc. for data analysis.

UNIT 2 Statistical & Probabilistic analysis of Data: Multiple hypothesis testing, Parameter Estimation methods, Confidence intervals, Bayesian statistics and Data Distributions.

UNIT 3 Dimensionality reduction: PCA & SVD, Correlation & Regression analysis, Training & Testing data: Overfitting & Under fitting.

UNIT 4 Introduction to Information Retrieval: Boolean Model, Vector model, Probabilistic Model, Text based search: Tokenization , Tf-IDF, stop words and n-grams , synonyms and parts of speech tagging

UNIT 5 Introduction to Web Search & Big Data : Crawling and Indexes, Search Engine architectures, Link Analysis and ranking algorithms such as HITS and PageRank Hadoop File system & MapReduce Paradigm

DIRECT ASSESMENT:

ASSESMENT OF THEORY

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).

2. End semester Theory Exam (70%).

INDIRECT ASSESMENT:

1. Feedback of students on attainment of cos.

2. Feedback of students on classroom learning.

3. External examiners feedback on Cos.

TEXT BOOKS RECOMMENDED:

1. Field Cady, "The Data Science Handbook" , 1/e ,2018,Publisher: Wiley.

2. Sinan Ozdemir, "Principles of Data Science ", 1/e, 2016Packt Publishing Limited.

REFERENCE BOOKS:

1. Peter Bruce, "Practical Statistics for Data Scientists: 50 Essential Concepts",Shroff/O'Reilly; First edition (2017).

2. Pang-Ning Tan, "Introduction to Data Mining", Pearson Edu., 2007.

3. Ricardo Baeza-Yates andBerthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education, 2004.

RESEARCH JOURNALS:

1. International Journal of Data Science and Analytics.

2. ACM Transactions on Knowledge Discovery in Data (TKDD).

3. Data Mining and Knowledge Discovery journal.

4. The international journal Advances in Data Analysis and Classification.

I YEAR B.Tech. (4YDC)

Common To All Branches

Semester - A

S. No.	Subject Category	Subject Code	Subject Name	Hours per Week			Credits		Maximum Marks				
									Theory		Practical		Total
				L	T	P	Th	Pr	Th.	CW	SW	Pr.	
1	BSC	MA 10001	Mathematics - I	3	1	0	4	0	70	30	0	0	100
2	BSC	PH10016	Physics	2	1	-	3	-	70	30	-	-	100
3	ESC	EE10015	Fundamentals of Electrical Engineering	2	1	-	3	0	70	30	0	0	100
4	ESC	CE10013	Fundamentals of Civil Engineering & Applied Mechanics	2	1	-	3	0	70	30	0	0	100
5	ESC	ME10049	Engineering Graphics	2	-	-	2	-	70	30	-	-	100
6	BSC (LC)	PH10151	Applied Physics Lab	-	-	2	-	1	-	-	20	30	50
7	ESC (LC)	EE10152	Electrical Engineering Lab	-	-	2	-	1	-	-	20	30	50
8	ESC (LC)	ME10153	Engineering Graphics Lab	-	-	4	-	2	-	-	40	60	100
9	HSMC	HU10191	Extra /Co curricular Activity	-	-	2	-	1	-	-	50	0	50
10	MC		Induction program & Universal Human Values	2-3 weeks in the beginning of I Year & 1 hour per week during semester									
TOTAL				11	4	10	15	5	350	150	130	120	750

Semester - B

S. No.	Subject Category	Subject Code	Subject Name	Hours per Week			Credits		Maximum Marks				
									Theory		Practical		Total
				L	T	P	Th	Pr	Th.	CW	SW	Pr.	
1	BSC	MA 10501	Mathematics – II	3	1	-	4	-	70	30	0	0	100
2	BSC	CH10516	Chemistry	3	-	-	3	-	70	30	-	-	100
3	HSMC	HU10551	Technical English	2	-	-	2	-	70	30	0	0	100
4	ESC	CO10507	Programming for Problem Solving	2	1	-	3	-	70	30	0	0	100
5	ESC	EC10508	Basic Electronics Engineering	2	-	-	2	-	70	30	0	0	100
6	BSC (LC)	CH10656	Chemistry Lab	-	-	2	-	1	-	-	20	30	50
7	HSMC (LC)	HU10653	Language Lab	-	-	2	-	1	-	-	20	30	50
8	ESC (LC)	CO10654	Computer Programming Lab	-	-	2	-	1	-	-	20	30	50
9	ESC (LC)	IP10655	Manufacturing Practices	-	-	4	-	2	-	-	40	60	100
10	HSMC	HU10691	Extra /Co curricular Activity	-	-	2	-	1	-	-	50	-	50
11	MC		Induction program & Universal Human Values	2-3 weeks in the beginning of I Year & 1 hour per week during semester									
TOTAL				12	2	12	14	6	350	150	150	150	800

Engineering Certificate shall be awarded after acquiring additional 10 credits out of which 6 credits as 2 Months industrial training within five years

25/11/2022

Academic Year: 2023-24

Department of Computer Engineering

B.TECH. II YEAR COMPUTER SCIENCE & ENGINEERING

SEMESTER 'A'

S. No.	Subject Category	Subject Code	Subject Name	Hours per Week			Credits			Max. Marks				
				L	T	P	Th.	Pr.	Total	Theory		Practical		Total
										Th.	CW	SW	Pr.	
1.	BSC	MA24003	Mathematics -III	3	1	-	4	-	4	70	30	-	-	100
2.	PCC	CO 24057	Object Oriented Programming Systems	3	1	2	4	1	5	70	30	40	60	200
3.	PCC	CO 24009	Computer Architecture	3	-	2	3	1	4	70	30	40	60	200
4.	ESC	EC ____	Microprocessors and Microcontrollers	3	-	2	3	1	4	70	30	40	60	200
5.	HSMC	HU 24005	Economics for Engineers	3	-	-	3	-	3	70	30	-	-	100
6.	LC	CO 24497	Programming Practices	-	1	2	-	2	2	-	-	40	60	100
7.	ESC/ LC	EC 24498	Electronics Workshop	-	-	2	-	1	1	-	-	40	60	100
			Total	15	3	10	17	6	23	350	150	200	300	1000

SEMESTER 'B'

S. No.	Subject Category	Subject Code	Subject Name	Hours per Week			Credits			Max. Marks				
				L	T	P	Th.	Pr.	Total	Theory		Practical		Total
										Th.	CW	SW	Pr.	
1.	PCC	CO 24553	Discrete Structures	3	-	-	3	-	3	70	30	-	-	100
2.	BSC	MA 24554	Mathematics - IV	3	1	-	4	-	4	70	30	-	-	100
3.	PCC	CO 24507	Data Structures	3	1	2	4	1	5	70	30	40	60	200
4.	PCC	CO 24508	Operating Systems	3	-	2	3	1	4	70	30	40	60	200
5.	OEC	EC 24509	Digital Communication	3	-	2	3	1	4	70	30	40	60	200
6.	LC	CO 24992	Computer Workshop	-	-	2	-	1	1	-	-	40	60	100
7.	LC	CO 24991	Design thinking Lab-I	-	-	2	-	1	1	-	-	40	60	100
8.	HSBC	HU 24881	Values, Humanities and Professional Ethics	-	2	-	2	-	2	-	100	-	-	100
9.	MC	HU____	Constitution of India(Audit)	-	2	-	-	-	-	-	50	-	-	-
			Total	15	6	10	19	5	24	350	300	200	300	1100

B.TECH. III YEAR COMPUTER SCIENCE & ENGINEERING

SEMESTER 'A'

S No	Category	Subject Code	Subject Nomenclature	Hours Per Week			No. of Credits			Maximum Marks				
				L	T	P	Th	Pr.	Total	Th.	CW	SW	Pr.	Total
1	PCC	CO34002	Theory of Computation	3	1	-	4	-	4	70	30	-	-	100
2	PCC	CO34005	Data Base Management Systems	3	1	2	4	1	5	70	30	40	60	200
3	PCC	CO34007	Computer Networks	3	1	2	4	1	5	70	30	40	60	200
4	PCC	CO34014	Agile Software Methodology	3	-	2	3	1	4	70	30	40	60	200
5	LC	CO34451	Skill Development Lab	-	-	2	-	1	1	-	-	20	30	50
6	LC	CO 34452	Design Thinking Lab-II	-	-	2	-	1	1	-	-	20	30	50
7	SI	CO34481	Evaluation of Industrial Training/Internship-I	-	-	-	-	2	2	-	-	100	-	100
8	OEC	CO____	Open Elective Course-I	3	1	-	4	-	4	70	30	-	-	100
9	MC	HU____	Essence of Indian Traditional Knowledge(Audit)	-	2	-	-	-	-	-	-	-	-	-
			Total	15	6	10	19	7	26	350	150	260	240	1000

SEMESTER 'B'

S No	Category	Subject Code	Subject Nomenclature	Hours Per Week			No. of Credits			Maximum Marks				
				L	T	P	Th	Pr	Total	Th.	CW	SW	Pr.	Total
1	PCC	CO34553	Machine Learning	3	-	2	3	1	4	70	30	40	60	200
2	PCC	CO34554	Foundation of Information Security	3	-	-	3	-	3	70	30	-	-	100
3	PCC	CO34563	Design and Analysis of Algorithms	3	-	2	3	1	4	70	30	40	60	200
4	PCC	CO34881	Internet of Things	-	1	2	-	2	2	-	-	40	60	100
5	PEC	CO_____	Elective-I	3	-	2	3	1	4	70	30	40	60	200
6	PROJ	CO34999	Major Project Planning and Seminar	-	-	4	-	2	2	-	-	40	60	100
7	OEC	CO____	Open Elective Course-II	2	1	2	3	1	4	70	30	40	60	200
			Total	6	2	14	15	8	23	350	150	240	360	1100

Internship / training in industry or organization of minimum 2 weeks to be carried out after sem. "A" or Sem. "B" but before commencement of IV Year Sem. "A". Evaluation shall be done in IV Year Sem. "A".

All Elective subjects may be offered in offline mode/ MooCs mode.

List of Open Elective Course-I Subjects

1 CO34298 Artificial Intelligence
2 MB34297 Organization Behaviorand Human Resource Management

List of Open Elective Course-II Subjects

1. CO34701 Android Application Development
2. CO_____ Open Source Technologies

B.TECH. IV YEAR COMPUTER SCIENCE & ENGINEERING (wef. 2023-24)

will be applicable to students entered in 2021-22 passed in BoS; will be passed in academic council later

SEMESTER 'A'

S. No.	Category	Code No.	Subject Nomenclature	Hours Per Week			No. of Credits		Total	Maximum Marks				Total
				L	T	P	L	P		Th.	CW	SW	Pr.	
1.	PEC		Elective – II	3	-	-	-	-	3	70	30	40	60	200
2.	PEC		Elective – III	3	-	2	3	1	4	70	30	40	60	200
3.	PEC		Elective – IV	3	-	-	3	-	3	70	30	40	60	200
4.	LC	CO____	Product Development & QA Workshop	-	1	2	1	1	2	-	-	80	120	200
5.	LC	CO44401	System Operations Lab	-	-	2	-	1	1	-	-	40	60	100
6.	PROJ	CO44498/ CO 44998	Major Project Phase-I/ Major Project Phase-II	-	-	4	-	2	2	-	-	80	120	200
7.	SI	CO44481	Internship Evaluation - II	-	-	-	-	2	2	-	-	100	-	100
			Total	9	1	10	7	7	17	210	90	420	480	1200

SEMESTER 'B'

S. No.	Category	Code No.	Subject Nomenclature	Hours Per Week			No. of Credits		Total	Maximum Marks				Total
				L	T	P	L	P		Th.	CW	SW	Pr.	
1.	PEC		Elective –V	2	-	-	2	-	2	70	30	-	-	100
2.	PEC		Elective – VI	2	-	-	2	-	2	70	30	-	-	100
4.	PROJ	CO44998/ CO 44498	Major Project Phase - II / Major Project Phase – I	-	-	4	-	2	2	-	-	80	120	200
3.	SI	CO44882	Internship Evaluation - III	-	-	-	-	4	4	-	-	100	-	100
			Total	4	-	4	4	6	10	140	60	180	120	500

*For Elective-II and Elective-IV.

All Elective subjects may be offered in offline mode/ MooCs mode.

List of Electives

Elective-I			Elective-II		
1.	CO 34601	Data Science & Engineering	1.	CO___	Computational Intelligence
2.	CO___	Compiler Construction	2.	CO___	Advanced Data Structures
3.	CO___	Wireless & Mobile Networks	3.	CO 44242	Cloud Computing
4.	CO 34602	Object Oriented Software Engineering	4.	CO___	Software Architecture
5.	CO___	Computer Graphics	5.	CO___	Multimedia System
6.	CO___	Embedded Systems	6.	CO___	VLSI System Design
Elective-III			**Elective-IV**		
1.	CO 44251	Deep Learning	1.	CO___	Reinforcement Learning
2.	CO___	Advanced Algorithms	2.	CO___	Advanced Databases
3.	CO 44252	Big Data	3.	CO 44307	Cyber Security and Forensics
4.	CO___	Human Computer Interaction	4.	CO 44308	Web Technologies
5.	CO___	Real Time Systems	5.	CO___	Virtual Reality
6.	CO___	Software Verification	6.	CO___	Robotics
			7.	CO___	Natural Language Processing
			8.	CO___	Software Testing
Elective-V			**Elective-VI**		
1.	CO___	Bioinformatics Computing	1.	CO___	Advanced Operating Systems
2.	CO___	High Performance Computing	2.	CO___	Network Management & Maintenance
3.	CO___	Machine Learning for Security	3.	CO 44706	Software Project Management
4.	CO 44608	Game Design	4.	CO___	Image Processing and Computer Vision
5.	CO___	Digital Signal Processing	5.	CO 44707	Block Chain Technology
6.	CO___	Security in Resource Constrained Environment	6.	CO___	Data Mining
7.	CO___	Advanced Graph Theory	7.	CO___	User Centric Computing for Human Computer Interaction
8.	CO___	Introduction to Soft Computing			