Department of
Computer Science and Engineering

Agenda & Minutes
Of
The BOS Meeting
CSE/CSD/M.Tech.

BOS meeting
Conducted on 04th June 2024

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed to be University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A++ GRADE

Department of Computer Science and Engineering

Date: 05/06/2024

Minutes of Meeting of Board of Studies

The Meeting of Board of Studies (BoS) in Computer Science & Engineering was held on 04 June 2024 **through Hybrid Mode**. During the meeting following were present.

1.	Dr. Manish Dixit, Professor & Head Department of Computer Science and Engineering Madhav Institute of Technology and Science, Gwalior	**Chairman**
2.	Dr. A. K. Solanki, Professor (Computer Science & Engineering), B.I.E.T. Jhansi (U.P.)	External Member (Academics) ***(Nominee of Hon'ble Vice Chancellor RGPV Bhopal)***
3.	Dr. Shekher Verma , Professor IIIT, Allahbad	External Member (Academics) ***AC Nominee***
4.	Dr. K.V Arya, Professor, IIITM Gwalior	External Member (Academics) ***AC Nominee***
5.	Ms Ruby Malhotra, Co-Founder & Executive Director, Kailtech Test & Research Centre Pvt Ltd , Indore,	**representative from industry/**
6.	Ravikant Sharma, Assistant Vice Precedent Citi Bank Singapore	Alumnus
7.	Dr. R. K. Gupta, Professor	Member
8.	Ms. Khushboo Agarwal, Assistant Professor	Member
9.	Ms. Jaimala Jha, Assistant Professor	Member
10.	Mr. Mahesh Parmar, Assistant Professor	Member
11.	Mr. Amit Kumar Manjhvar, Assistant Professor	Member
12.	Dr.Ranjeet Kumar Singh	Member
13.	Ms.Smita Parte, Assistant Professor	Member
14.	Dr. R. S. Jadon, Professor (Computer Application)	Member
15.	Dr. Anshu Chaturvedi, Professor (Computer Application)	Member
16.	Dr. Parul Saxena, Asst Professor (Computer Application)	Member

In addition of this following student members were also present

1.	Nishika Garg	Student Member
2.	Aditya Soni	Student Member
3.	Ayushi Ranjan	Student Member
4.	Aryan Gupta	Student Member

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Agenda of the BoS Meeting

(BoS Meeting Scheduled to be held up to 30th May 2024)

Instructions for preparing BoS Proceedings

(All information is to be uploaded on the webpage under suitable heading (such as Board of Studies) and separate links to be provided for each category mentioned below)

1. Minutes should have a summary/cover page mentioning all the significant changes made in the following Given format

Courses where revision was carried out*

(Course/subject name)	Course Code	Year/Date of introduction	Year/Date of revision	Percentage of content added or replaced	Agenda Item No.	Page No.	Link of relevant documents/minutes
Database Management System	3150304	June 23	June 24	10	14	11	
Database Management System	3290304	June 23	June 24	10	14	11	

Courses focusing on employability/entrepreneurship/ skill development*

(Course/subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.	Link of relevant documents/minutes
Data Mining & Warehousing		The course will cover the fundamentals of data mining. It will explain the basic algorithms like data pre-processing, association rules, classification, clustering, sequence mining and visualization. It will also explain implementations in open-source software. Finally, case studies on industrial problems will be demonstrated.	2	7	
Reinforcement Learning		Reinforcement learning is a paradigm that aims to model the trial-and-error learning process that is needed in many problem situations where explicit instructive signals are not available. It has roots in operations research, behavioral psychology and AI. The goal of the course is to introduce the basic mathematical foundations of reinforcement learning, as well as highlight some of the recent directions of research.	3	8	
Big Data Computing		This course provides an in-depth understanding of terminologies and the core concepts behind big data problems, applications, systems and the techniques, that underlie today's big data computing technologies. It provides an introduction to some	3	8	

		of the most common frameworks such as Apache Spark, Hadoop, MapReduce, Large scale data storage technologies such as in-memory key/value storage systems, NoSQL distributed databases, Apache Cassandra, HBase and Big Data Streaming Platforms such as Apache Spark Streaming, Apache Kafka Streams that has made big data analysis easier and more accessible.				
	Design & Implementation of Human-Computer Interfaces		In this course we will get introduced to the human-computer interfaces, concept of usability and its engineering.	3	8	
	Deep Learning - IIT Ropar		In this course we will start with traditional Machine Learning approaches, e.g. Bayesian Classification, Multilayer Perceptron etc. and then move to modern Deep Learning architectures like Convolutional Neural Networks, Autoencoders etc. On completion of the course students will acquire the knowledge of applying Deep Learning techniques to solve various real life problems.	3	8	
	Algorithmic Game Theory		This course is an introduction to game theory and mechanism design. The goal is to equip students with a general purpose tool to analyze strategic behavior in multi-agent interaction. Though primarily a topic of economic flavor, it has significant applications in the decision process of a multi-agent environment like sponsored advertisements, crowdsourcing, social media, internet-based trade, and several settings of social choice and welfare. This course is a backend of such applications and discusses the mathematical details of analyzing and designing strategic interactions.				
	Ethical Hacking		This course will cover introduction to ethical hacking. Fundamentals of computer networking. TCP/IP protocol stack. Vulnerability scanning using NMAP and Nessus. Creating a secure hacking environment. System Hacking: password cracking, privilege escalation, application execution. Malware and Virus. ARP spoofing and MAC attack.	7	9		

			Different types of attacks using Metasploit framework: password cracking, privilege escalation, remote code execution, etc. Attack on web servers: password attack, SQL injection, cross site scripting.Case studies: various attacks scenarios and their remedies.			
	Introduction to Internet of Things		This course will cover Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II, Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications, Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II, Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT,Connected Vehicles, Smart Grid, Industrial IoT,Case Study: Agriculture, Healthcare, Activity Monitoring	7	9	
	Cloud Computing & Virtualization		Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort. This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends.	8	10	
	Data Science		Data science involves analyzing large volumes of data to extract insights, patterns, and trends. It combines statistical analysis, machine learning techniques, and programming skills to solve complex problems and make data-	8	10	

		driven decisions. Data scientists utilize tools like Python or R to clean, manipulate, and visualize data, and create predictive models for various industries and domains.			
Information Security		The course provides the basic paradigm and principles of modern cryptography. The focus of this course will be on definitions and constructions of various encryption methods.what security properties are desirable in such objects, how to formally define these properties, and how to design objects that satisfy the definitions.	8	10	
Programming In Java		To meet this requirement object-oriented paradigm has been developed and based on this paradigm the Java programming language emerges as the best programming environment. Now, Java programming language is being used for mobile programming, Internet programming, and many other applications compatible to distributed systems. This course aims to cover the essential topics of Java programming so that the participants can improve their skills to cope with the current demand of IT industries and solve many problems in their own filed of studies.	7	10	
Software Design & Project Management		Software Project Management (SPM) is a proper way of planning and leading software projects. It is a part of project management in which software projects are planned, implemented, monitored, and controlled.	8	10	
Design Patterns		A design pattern is a general repeatable solution to a commonly occurring problem in software design. A design pattern isn't a finished design that can be transformed directly into code. It is a description or template for how to solve a problem that can be used in many different situations.	8	10	
Design & Analysis of Algorithms		This course will cover basic concepts in the design and analysis of algorithms. 1. Asymptotic complexity, notation 2. Sorting and search 3. Algorithms on graphs: exploration, connectivity, shortest paths, directed acyclic graphs,	13	11	

		spanning trees 4. Design techniques: divide and conquer, greedy, dynamic programming 5. Data structures: heaps, union of disjoint sets, search trees 6. Intractability			
Database Management System		he course introduces relational data models; entity-relationship modeling, SQL, data normalization, and database design. Further it introduces query coding practices using MySQL (or any other open system) through various assignments. Design of simple multi-tier client / server architectures based and Web-based database applications is also introduced.	13	11	

New Courses added*					
(Course/subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.	Link of relevant documents/minutes
Digital Image Processing	290711	The goal of digital image processing is to enhance the quality of images, extract meaningful information from images, and automate image-based tasks.	2	7	**Annexure-2**
Parallel Processing	290712	Parallel processing is used to increase the computational speed of computer systems by performing multiple data-processing operations simultaneously.	2	7	**Annexure-2**
Wireless Network	290713	Wireless LANs can work with or without an AP, depending on the number of users in the network. Infrastructure mode uses APs to allow wireless computers to send and receive information.	2	7	**Annexure-2**
Applied Accelerated Artificial Intelligence		This course will cover the fundamentals of the compute capabilities and the system software required for implementing artificial intelligence (AI) based solutions on industrial use cases such as the ones in the domains of healthcare and Smart City. The course will discuss end to end deployments of two industrial use cases with demonstration, and hence will help	3	9	

		participants use state-of-the-art AI SDKs effectively to solve complex problems.			
Secure Computation: Part II		Secure multi-party computation (MPC) is one of the most fundamental problems in cryptography as well as distributed computing. In a nutshell, a MPC protocol allows a set of mutually distrusting parties with private inputs, to perform any joint computation on their data, by keeping their respective data as private as possible. Secure MPC abstracts several real-world problems, for example privacy-preserving data mining, privacy-preserving ML, secure e-auctions, private matchmaking, secure set-intersection, secure e-voting, secure signal-processing, secure bioinformatics, secure biometrics, secure outsourcing, to name a few.	7	9	
Practical Cyber Security for Cyber Security Practitioners		cyber security which also requires a great deal of fundamental thinking, reasoning, and concerns about human cognition of the inputs the operators and leaders receive from cyber security tools, dashboards, policy formulations but then in the crowd of details, fundamentals are lost, reasoning is replaced by ad hoc decisions.	7	9	
Multi-Core Computer Architecture		Design issues for improving memory access time, Basic and Advanced Optimization Techniques in Cache Memory, Tiled Chip Multicore Processors (TCMP), Network on Chips (NoC), Routing Algorithms, NoC router – architecture, Routing and flow control	7	10	
Randomized Methods in Complexity		In this course, study how randomness helps in designing algorithms and how randomness can be removed from algorithms.	7	10	

Feedback on curriculum received from stakeholders: Analysis& ATR*

Stakeholder	Student	Faculty	Alumni	Employer
No. of responses	780	17	13	73
Link of Analysis	<VIEW>	<VIEW>	<VIEW>	<VIEW>
ATR Link	<VIEW>	<VIEW>	<VIEW>	<VIEW>
Link showing Excel sheet of Google Form details of stakeholders	moodle	moodle	<VIEW>	<VIEW>

** Separate page(s) for each of the above four points; Agenda point wise minutes to be appended with each point and a separate link to be given in the appropriate column for each point*

2. The BoS minutes along with the cover/summary page (under point number 1, above) must be uploaded on the departmental web page and link for the same must be shared with the office of the Dean Academics.

3. Stakeholder feedback analysis must also contain an action taken report (ATR).
The details/data of the stakeholder responded through GOOGLE form (such as Name, organization, mail id, phone no if available) must also be shared along with the feedback for the alumni/employer.

4. The following must be uploaded on the departmental web page and link for the same must be shared with the office of the Dean Academics.
   (i) The Stakeholder feedback collected & analyzed to find the index out of five
   (ii) Action taken report
   (iii) Google form showing responses from alumni, employer, student, faculty etc.

5. Minutes should have a footer with department name, page number, month of meeting.

6. Each page should be signed by all faculty, scanned and then submitted to the Dean Academics office.

BoS Agenda Items

Item 1

To confirm the minutes of previous BoS meeting held in the month of December 2023

Minutes of the last BoS held on 01 Dec 2023 are confirmed by the house.

Item 2

To review and finalize the **scheme structure of B.Tech. VII Semester** with the provision of *Three (03) Departmental Electives (DEs) and Open Category (OC) Course.* **(Out of which One (01) Elective and o1 Open category course is to be offered in traditional mode** and **remaining Two (02) Departmental Electives are to be offered in online mode** with credit transfer **for the batch admitted in 2021-22**.

The scheme for B.Tech VII Semester, CSE and CSD discipline (under flexible curriculum) were discussed and finalized.

The Scheme of CSE VII semester is enclosed in Annexure- 1
The Scheme of CSD VII semester is enclosed in Annexure-2

Item 3

To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in **online mode for Two (02) Departmental Electives** (DE) Course, with credit transfer in the B.Tech. VII Semester under the flexible curriculum (Batch admitted in 2021-22)

The list of Departmental Elective (DE-3) and (DE-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VII Semester, CSE discipline (under flexible curriculum) were discussed and finalized, as per the following detail.

*DE-3(SWAYAM/NPTEL/ MOOC platform)	
1	Reinforcement Learning
2	Big Data Computing
3	Design & Implementation of Human-Computer Interfaces

*DE-4 (SWAYAM/NPTEL/ MOOC platform)	
1	Deep Learning - IIT Ropar
2	Approximation Algorithm
3	Deep Learning for Computer Vision

The list of Departmental Elective (DE-3) and (DE-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VII Semester, CSD discipline (under flexible curriculum) were discussed and finalized, as per the following detail.

*DE-3 (SWAYAM/NPTEL/ MOOC platform)	
1	C-Based VLSI Design
2	Applied Accelerated Artificial Intelligence
3	Design & Implementation of Human-Computer Interfaces

*DE-4 (SWAYAM/NPTEL/ MOOC platform)	
1	Algorithmic Game Theory
2	Computer Vision
3	Cloud Computing

Item 4

To prepare and finalize the syllabus of courses to be offered *(for batch admitted in 2021-22)* under *Departmental Elective (DE) Course* (in traditional mode) for B. Tech. *VII Semester* along with their COs

The syllabi for all Departmental Elective Courses (DE) for B.Tech VII Semester, CSE & CSD discipline (under flexible curriculum) were discussed and finalized.

The Syllabi of CSE VII semester is enclosed in Annexure- 3
The Syllabi of CSD VII semester is enclosed in Annexure-4

Item

To prepare and finalize the syllabus of courses to be offered (**for batch admitted in 2021-22**) under the **Open Category (OC) Courses** (in traditional mode) for B.Tech. VII semester students of other departments along with

5

their Cos

The courses to be offered under Open Category (OC) Courses for B.Tech VII Semester (for the students of other departments) under flexible curriculum were discussed and finalized for Batch admitted in 2021-22. Subjects are: -

Open Category (OC) Courses
Computer Networks
Web Technologies

It is further discussed that the Open Category (OC) courses are meant only for the students of other departments; therefore, the above list of courses may be kept dynamic (as per the need and demand from other departments). Syllabus (along with their COs) are attached in Annexure-5

Item 6

To review and finalize the Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B. Tech. VII semester ***(for batches admitted in 2021-22)***

Experiment list/ Lab Manual for Departmental Laboratory Courses (DLC) to be offered in **VII** ***(for batch admitted in 2021-22)is discussed and finalized***

Same is being attached in Annexure-6 for CSE and Annexure-6A for CSD

Item 7

To propose the list of "Additional Courses" which can be opted for getting an

(i) ***Honours (for students of the host department)***
(ii) ***Minor Specialization (for students of other departments)***

These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B.Tech. ***VII semester students*** *(for the batch admitted in 2021-22) and for* B.Tech. ***V semester*** *(for the batch admitted in 2022-23)*

The courses available on SWAYAM/NPTEL/MOOC based learning platforms for Honours and Minor Specialization were discussed and identified. The same is listed, as mentioned below

1) Courses for "Honours" VII Semester

***honours (SWAYAM/NPTEL/ MOOC platform)**
Track1-Information Security 1. Secure Computation: Part II 2. Practical Cyber Security for Cyber Security Practitioners
Track 2-IoT 1. Robotics 2. **Smart Grid: Basics to Advanced Technologies**
Track 3- High Performance Computing 1. Parameterized Algorithms 2. Statistical Learning for Reliability Analysis

2) Courses for "Minor Specialization" VII Semester

*Minor (SWAYAM/NPTEL/ MOOC platform) (For students of other branches)	
1	Software Engineering
2	Programming in Java
3	Computer Graphics

Courses for "Honours"- V Semester

*honours (SWAYAM/NPTEL/ MOOC platform)
Track1-Information Security 1. Cyber Security and Privacy 2. Ethical Hacking
Track 2-IoT 1. Introduction to Internet of Things 2. Sensor Technologies: Physics, Fabrication, and Circuits
Track 3- High Performance Computing 1. Multi-Core Computer Architecture 2. Randomized Methods in Complexity

Courses for "Minor Specialization"- V semester

*Minor (SWAYAM/NPTEL/ MOOC platform) (For students of other branches)	
1	Operating System Fundamentals
2	Computer Architecture
3	Programming, Data Structures and Algorithms using Python

Item 8

To review and finalize the ***scheme structure of B.Tech. V Semester under*** the flexible curriculum (***Batch admitted in 2022-23***)

The scheme for B.Tech. V Semester, CSE & CSD discipline under flexible curriculum curriculum (***Batch admitted in 2022-23***)

were discussed and finalized.

The Scheme of CSE V semester is enclosed in Annexure- 7
The Scheme of CSD V semester is enclosed in Annexure- 8

Item 9

To review and finalize the syllabi for all ***Departmental Core (DC) Courses*** of B. Tech. ***V Semester (for*** batch **admitted in 2022-23)** under the flexible curriculum along with their COs.

The syllabi for B.Tech. V Semester, CSE & CSD discipline under flexible curriculum curriculum (***Batch admitted in***

	2022-23) were discussed and finalized. The Syllabi of CSE V semester is enclosed in Annexure- 9 The Syllabi of CSD V semester is enclosed in Annexure- 10
Item 10	To review and recommend the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech. ***V Semester (for batch admitted in 2022-23)*** Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech. ***V Semester (for batch admitted in 2022-23) is discussed and finalized*** ***Same is being attached in Annexure11 for CSE and Annexure 11A for CSD***
Item 11	To review and recommend the list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory components-based courses to be offered in B.Tech. **V Semester *(for the batch admitted in 2022-23)***. list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory components-based courses to be offered in B.Tech. V Semester *(for the batch admitted in 2022-23),)is discussed and finalized* *Same is being attached in Annexure12 for CSE and Annexure 12A for CSD*
Item 12	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for batch admitted in 2022-23)*** in online mode under ***Self-Learning/ Presentation***, in the B.Tech. ***V Semester*** The courses available on SWAYAM/NPTEL/MOOC Platforms to be offered (for batch admitted in 2022-23) in online mode under Self-Learning/ Presentation, in the B.Tech. V Semester. The same is listed, as mentioned below Demystifying Networking Introduction to Quantum Computing: Quantum Algorithms and Qiskit
Item 13	To review and finalize the ***scheme structure of B.Tech. III Semester under*** the flexible curriculum (***Batch admitted in 2023-24***) the *scheme structure of B.Tech. III Semester under* the flexible curriculum (*Batch admitted in 2023-24*) were discussed and finalized. The Scheme of CSE III semester is enclosed in Annexure- 13 The Scheme of CSD III semester is enclosed in Annexure- 14
Item 14	To review and finalize the syllabi for all Departmental Core (DC) Courses of ***B. Tech. III Semester*** (for batch **admitted in 2023-24**) under the flexible curriculum along with their COs. The *syllabi of B.Tech. III Semester under* the flexible curriculum (*Batch admitted in 2023-24*) were discussed and finalized. The syllabi of CSE III semester is enclosed in Annexure- 15 The syllabi of CSD III semester is enclosed in Annexure- 16
Item 15	To review and recommend the list of experiments and skill-based mini projects of ***B.Tech. III semester*** (for **batch admitted in 2023-24)**

	Experiment list/ Lab manual and skill-based mini projects for all the Laboratory Courses to be offered in B. Tech. ***III Semester CSE & CSD (for batch admitted in 2023-24) is discussed and finalized Same is being attached in Annexure17 for CSE and Annexure 17A for CSD***
Item 16	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered in the ***B.Tech .III Semester (for batches admitted in 2023-24)*** in online mode under ***Self-Learning/ Presentation***. The courses available on SWAYAM/NPTEL/MOOC Platforms to be offered (for batch admitted in 2023-24) in online mode under Self-Learning/ Presentation, in the B.Tech. III Semester. The same is listed, as mentioned below Stress Management Introduction to Quantum Computing: Quantum Algorithms and Qiskit
Item 19	To review and recommend the ***Scheme structure & Syllabi*** of **PG Programme** (M.E./M.Tech./MCA/MBA) along with their Course Outcomes (COs) <VIEW> **Scheme and Syllabus of M.Tech Course, CSE discipline is enclosed in Annexure 18**
Item 20	To review and recommend the ***Scheme structure and Syllabus*** of **Ph.D. Course Work** (specific to Doctoral Research Scholars, if any) The scheme structure and Syllabus of Ph.D. Course, CSE discipline (under flexible curriculum) were discussed and finalized. <VIEW> **Scheme and Syllabus of Ph.D. Course, CSE discipline is enclosed in Annexure**
Item 21	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for all the courses taught during **July-Dec 2023 session**. CO attainments <VIEW> CO attainment levels for all the courses taught during July-Dec 2023 session **is enclosed in Annexure 19**
Item 22	To review the PO attainments levels and suggest the actions to be taken for improvement in PO attainment
Item 23	To review and finalize the CO-PO mapping matrix for all the courses to be taught in July-Dec 2024.
Item 23	To review curricula feedback from various stakeholders, its analysis and impact Student & Faculty Co/Curriculum <VIEW> Alumni <VIEW> Employer <VIEW> **Feedback from various stakeholders is enclosed in Annexure 20**
Item 23	Any other matter Following rectification are required to be made

S.no.	Semester	Category	Subject name	Change made

		Code		
1.	IV (CSE & CSD)	Natural Science & Skills	Environmental engg. Under natural science & skills	Code change-3000005 Lab credit is changed to theory credit
2.	VI CSD	DE course	Getting started with competitive Programming	One additional DE-1 course is added (NPTEL) 2021 admitted batch
3.	VIII CSE	DE course	Foundation of Cyber Physical Systems	One additional DE-5 course is added (NPTEL) 2020 admitted batch
4.	VIII CSE	OC category	Linear programming and its application to computer science	One additional OC course is added (NPTEL) 2020 admitted batch
5.	VIII CSE	DE course	Probability of computer science	One additional DE-5 course is added (NPTEL) 2020 admitted batch
6.	II M.Tech(CSE)	OC category	Foundation of cloud IOT and Edge ML	One additional OC course is added in M.Tech CSE IInd sem (NPTEL) 2023 admitted batch
7.	II M.Tech(CSE)	DE category	Linear programming and its application to computer science	One additional DE course is added in M.Tech CSE IInd sem (NPTEL) 2023 admitted batch

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Department of Computer Science and Engineering

Scheme

VIIth Sem CSE

ANNEXURE 1

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. VII Semester *(CSE)*

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted									Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.
				Theory Slot				Practical Slot			MOOCs								
				End Term Evaluation		Continuous Evaluation			Continuous Evaluation					L	T	P			
				End Sem. Exam	*Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment	End Sem. Exam.	Lab Work & Sessional	Skill Based Mini Project	Assignment	Exam							
1.	DE	DE	Departmental Elective (DE-2)	50	10	20	20	-		-	-	-	100	3	-	-	3	Blended	PP
2.	DE	DE	Departmental Elective (DE-3)	-		-	-	-		-	25	75	100	3	-	-	3	Online	MCQ
3.	DE	DE	Departmental Elective (DE-4)	-		-	-	-		-	25	75	100	3		-	3	Online	MCQ
4.	OC	OC	Open Category (OC-2)	50	10	20	20	-		-	-	-	100	3	-	-	3	Blended	PP
6.	150701	DLC	Departmental Lab (DLC-6)					60	20	20		-	100	-	-	4	2	Offline	SO
7.	150702	DLC	Summer Internship Project-III (04weeks) (Evaluation)(DLC-7)	-		-	-	60		-	-	-	60	-	-	4	2	Online and Mentoring	SO
8.	150703	DLC	Creative Problem Solving(Evaluation)(DLC-8)	-		-	-	25	25		-	-	50	-	-	2	1	Offline	SO
			Total	100	20	40	40	145	45	20	50	150	610	12	-	10	17	-	
9.	1000008	MAC	Universal Human Values & Professional Ethics (UHVPE)	50	10	20	20	-	-	-	-	-	100	02	-	-	Grade	Online	MCQ

*Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/ subject
Natural Sciences & Skills / Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
[illegible] & Skills (Industrial Training / Seminar)

MCQ: Multiple Choice Question AO: Assignment + Oral PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
	6	6	-	5	-	6	-	6	3	2	17
	35	35	-	30	-	35		35	18	12	Credits %

DE-2(Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	150714	Adhoc Networks
2.	150712	Data Mining & Warehousing
3.	150713	Distributed Systems

OC-2		
S. No.	Subject Code	Subject Name
1.	900222	Computer Networks
2.		Web Technologies

DE-3*		
S. No.	Subject Code	Subject Name
1.	150765	Reinforcement Learning
2.	150766	Big Data Computing
3.	150767	Design & Implementation of Human-Computer Interfaces

DE-4*		
S. No.	Subject Code	Subject Name
1.	150768	Deep Learning - IIT Ropar
2.	150771	Approximation Algorithm
3	150772	Deep Learning for Computer Vision

List of courses to be opted for Honors or Minor specialization in VII Semester

Minor Specialization*(*to be opted by students of Other Department*)
Software Engineering
Programming in Java
Computer Graphics

Honors* ***(to be opted by students of Parent Department)***	
Track1	Course
Information Security	Secure Computation: Part II
	Practical Cyber Security for Cyber Security Practitioners
	Responsible & Safe AI
IoT	Robotics
High Performance Computing	Smart Grid: Basics to Advanced Technologies (in place of this float other subject)
	Parameterized Algorithms
	Statistical Learning for Reliability Analysis

* **Course run through SWAYAM/NPTEL/MOOC Learning Based Platform**

Department of Computer Science and Engineering

Scheme

VIIth Sem CSD

ANNEXURE 2

Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. VII Semester *(CSD)*

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted									Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.
				Theory Slot				Practical Slot			MOOCs								
				End Term Evaluation		Continuous Evaluation			Continuous Evaluation					L	T	P			
				End Sem. Exam	*Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment	End Sem. Exam.	Lab Work & Sessional	Skill Based Mini Project	Assignment	Exam							
1.	DE	DE	Departmental Elective (DE-2)	50	10	20	20	-		-	-	-	100	3	-	-	3	Blended	PP
2.	DE	DE	Departmental Elective (DE-3)	-		-	-	-		-	25	75	100	3	-	-	3	Online	MCQ
3.	DE	DE	Departmental Elective (DE-4)	-		-	-	-		-	25	75	100	3		-	3	Online	MCQ
4.	OC	OC	Open Category (OC-2)	50	10	20	20	-		-	-	-	100	3	-	-	3	Blended	PP
6.	290701	DLC	Departmental Lab (DLC-6)					60	20	20		-	100	-	-	4	2	Offline	SO
7.	290702	DLC	Summer Internship Project-III (04weeks) (Evaluation)(DLC-7)	-		-	-	60		-	-	-	60	-	-	4	2	Online and Mentoring	SO
8.	290703	DLC	Creative Problem Solving (Evaluation)(DLC-8)	-		-	-	25	25		-	-	50	-	-	2	1	Offline	SO
			Total	100	20	40	40	145	45	20	50	150	610	12	-	10	17	-	
9.	1000008	MAC	Universal Human Values & Professional Ethics (UHVPE)	50	10	20	20	-	-	-	-	-	100	02	-	-	Grade	Blended	MCQ

*Proficiency in course/subject – includes the weightage towards ability / skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
Natural Sciences & Skills / Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

*Credits of Natural Sciences & Skills will be added in the 5 Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
	6	6	-	5	-	6	-	6	3	2	17
	35	35	-	30	-	35		35	18	12	Credits *4

DE-2(Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	290711	Digital Image Processing
2.	290712	Parallel Processing
3.	290713	Wireless Network

OC-2		
S. No.	Subject Code	Subject Name
1.	900222	Computer Networks
2.		Web Technologies

DE-3*		
S. No.	Subject Code	Subject Name
1.	290731	C-Based VLSI Design
2.	290732	Applied Accelerated Artificial Intelligence
3.	290732	Design & Implementation of Human-Computer Interfaces

DE-4*		
S. No.	Subject Code	Subject Name
1.	290721	Algorithmic Game Theory
2.	290722	Computer Vision
3	290723	Cloud Computing

List of courses to be opted for Honors or Minor specialization in VII Semester

Minor Specialization* *(to be opted by students of Other Department)*
Software Engineering
Programming in Java
Computer Graphics

Honors* ***(to be opted by students of Parent Department)***	
Track1	Course
Information Security	Secure Computation: Part II
	Practical Cyber Security for Cyber Security Practitioners
	Responsible & Safe AI
IoT	Robotics
High Performance Computing	Smart Grid: Basics to Advanced Technologies
	Parameterized Algorithms
	Statistical Learning for Reliability Analysis

Course run through SWAYAM/NPTEL/MOOC Learning Based Platform

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Department of Computer Science and Engineering

Syllabi

VIIth Sem CSE

ANNEXURE 3

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

AD HOC WIRELESS NETWORKS

150714 (DE)

COURSE OBJECTIVES

- Recognize needs of different set of MAC, routing and transport protocols for wireless
  computer networks compared to wired networks.
- Understand and Compare different types of MAC, Routing and Transport protocols for Ad hoc Networks.
- Analyze performance of MANET Routing Protocols under different mobility patterns.
- Identify different methods for energy saving in a mobile device.
- Identify future research directions.

Unit-I:

Introduction- Wireless Networks, Cellular Mobile Network, Wireless LAN, Ad Hoc Networks, Sensor Network, Differences between Cellular and Ad Hoc, Issues in Ad Hoc Wireless Networks, Applications of Ad Hoc Wireless Networks.

Unit-II

MAC Layer–Introduction, Issues and Need for Medium Access Control. Problems in Ad Hoc Channel Access such as Hidden Terminal Problem and Exposed Node Problem. Classification of MAC Protocols – Contention Based MAC Protocols such as ALOHA and CSMA, Contention-Based MAC Protocols with Reservation Mechanisms such as MACA and MACA-BI.

UNIT-III

Routing Protocols- Introduction, Classification of Routing Protocols- Proactive routing protocols such as WRP and DSDV, Reactive routing protocol such as AODV, DSR , LAR, Hybrid Routing protocols such as ZRP.

UNIT-IV

Transport Protocols and Energy Management Systems – Introduction, Design Issues and Challenges, Power Management, Smart Batteries and Battery Characteristics.

UNIT-V

Security- Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Security attacks.

RECOMMENDED BOOKS

- Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy, B. S. Manoj, Pearson Education India
- Ad Hoc Mobile Wireless Networks: Protocols and Systems, C.-K. Toh Pearson Publication.
- Wireless Networks Principles, Protocols, and Applications: Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, Auerbach Publications, Taylor & Francis Group
- Security and Quality of Service in Ad Hoc Wireless Networks, Amitabh Mishra, John Wiley & Sons, Cambridge University Press

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COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Outlines** the basics of wireless networks

CO2. **Identify** various issues/problems associated with Ad-hoc networks and their Solutions.

CO3. **Examine** the working of various Ad-hoc network protocols

CO4. **Analyse** the performance of various Ad-hoc network protocols

CO5. **Develop** the solutions of various problems/Issues associated with ad-hoc Networks

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Course Articulation Matrix

	1	1	1				1			1				
	1	2	2	3	3	1			2					
	1	2	2	3	2		1	2		1				3
		2	1	2			1						3	
	1	2	1		3				2		2		3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATA MINING & WAREHOUSING
150712 (DE)

COURSE OBJECTIVES:

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems

UNIT-1:

Introduction: Motivation: Important, Data type for Data Mining: Relational Databases Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining

UNIT-2:

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System

UNIT -3:

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

UNIT-4:

Mining Association Rules in Large Databases: Association Rule Mining Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

UNIT -5:

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd .

COURSE OUTCOMES:

After completion of this course, the students would be able to:

CO 1. **Classify** various databases systems and data models of data warehouse.

CO2. **Compare** various methods for storing & retrieving data from different data sources/repository.

CO3. **Apply** pre-processing techniques for construction of data warehouse.

CO4. **Analyze** data mining for knowledge discovery & prediction.

CO5. **Explain** data mining methods for identification of association for transactional databases.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DISTRIBUTED SYSTEMS
150713 (DE)

COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit - I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed System, Hardware and Software Concepts, Distributed Computing Model, Advantages & Disadvantage Distributed System, Issues in Designing Distributed System.

Unit -II

Distributed Share Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & Its Types, Design & Implementations Issues in DSM System, Structure of Share Memory Space, Consistency Model and Thrashing.

Distributed File System: Desirable Features of Good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault Tolerance.

Unit - III

Inter Process Communication and Synchronization: Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit - IV

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. **Deadlock-** Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.

Unit – V

Distributed Databases and Multimedia Management System

Distributed Data Base Management System (DDBMS), Types of Distributed Database, and Distributed Multimedia: - Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System: - Amoeba, Mach, Chorus

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RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI .
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the basic elements and concepts related to distributed system Technologies.
CO2. **Demonstrate** knowledge of the core architectural aspects of distributed systems.
CO3. **Identify** how the resources in a distributed system are managed by algorithm.
CO4. **Examine** the concept of distributed file system and distributed shared memory.
CO5. **Compare** various distributed system algorithms for solving real world problems.

Course Articulation Matrix

	3	2	1			1							3	1
	3	2	2	1									3	2
	3	3	2	1			1						3	2
	3	2	3	2	2	1	1		2	1		2	3	2
	3	2	2			1							3	2

1 - Slightly; 2 - Moderately; 3 – Substantially

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Syllabi

VIIth Sem CSD (2021 admitted)

ANNEXURE 4

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIGITAL IMAGE PROCESSING
290711(DE)

COURSE OBJECTIVES:

- To understand the fundamentals of image acquisition, image processing in spatial and frequency domain.
- To understand image transforms used in digital image processing.
- To know about the image restoration techniques and methods used in image processing.

Unit – I:

Introduction and Fundamental: Introduction to Image Processing Systems, Digital Image fundamentals: Components of Digital Image Processing Systems, Image Model, Image Geometry, Sampling and Quantization of Images, Classification of Digital Images, Zooming and Shrinking, Relationship between pixels.

Unit – II:

Image Enhancement in spatial Domain: Introduction, Basic Gray Level Function, Piecewise Linear Transformation, Contrast Stretching, Histogram Specification, Histogram Equalization, Local Enhancement using arithmetic and logical operation- Image Subtraction, Image averaging, Image Smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image Sharpening.

Unit – III:

Image Enhancement in Frequency Domain: Introduction to Fourier Transform, Filters: Low Pass and High Pass, Gaussian Filters, Homomorphic Filtering, Image Restoration: Model of Image Degradation/Restoration process, Noise Models, Noise Reduction in Spatial and Frequency Domain, Inverse Filtering, Mean Filters, Least Mean Square (Wiener) Filtering, FIR Wiener Filter.

Unit – IV:

Morphological Image Processing: Logic operation involving binary images, Dilation and Erosion, Opening and Closing, Morphological Algorithms: Boundary Extraction, Region filling, Extraction of connected components, Convex Hull, Thinning and Thickening.

Unit –V:

Image Registration: Introduction, Geometric Transformation, Plane to plane Transformation, Mapping, Image Segmentation: Introduction, Region Extraction, Pixel based approach, Multilevel Thresholding, Local Thresholding, Region based approach, Region growing, Splitting and Merging, Edge and line detection, Corner Detection, Detection of Discontinuities, Edge and boundary detection.

RECOMMENDED BOOKS:

1. Digital Image processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
2. Fundamental of Digital Image processing, K. Jain, Pearson education.
3. Digital Image Processing, S. Esakkirajan, S. Jayaraman, T. Veerakumar, Tata McGraw- Hill Education.

COURSE OUTCOMES: After completing the course, the student will be able to:

CO1: Explain different modalities and current techniques in image acquisition.

CO2: Classify spatial and frequency domain techniques used in image processing.

CO3: Apply image processing techniques to enhance visual images

CO4: Analyze the constraints in image processing when dealing with real problems.

CO5: Evaluate various enhancement, restoration and retrieval techniques of image processing.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Parallel Processing
290712(DE)

COURSE OBJECTIVES

- To introduce the fundamentals of parallel processing architectures and paradigms.
- To understand the technologies, system architecture, and communication architecture that propelled the growth of parallel processing systems.
- To develop and execute basic parallel processing applications using basic programming models and tools.

Unit-1

Introduction: Introduction to Parallel Computing, Key Concepts and Challenges, Flynn's Classification, System Attributes to Performance, Parallel computer models Multiprocessors and multicomputer, Multi-vector and SIMD Computers. Data and resource dependencies, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow, and Demand-driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks.

Unit-2

Instruction Architectures and Memory Hierarchy: Instruction set architecture, CISC Scalar Processors, RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, and Memory capacity planning. Interleaved memory organization, memory interleaving, pipelined memory access, Bandwidth, and Fault Tolerance. Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction, and interrupt.

Unit-3

Pipeline Processing: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling -score boarding and Tomasulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines, Superscalar pipeline design, Super pipeline processor design.

Unit-4

Parallel Computing communication: Cache coherence, Snoopy protocols, Directory-based protocols, Message routing schemes in multicomputer networks, deadlock, and virtual channels, Vector Processing Principles, Vector instruction types, Vector-access memory schemes, Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model, Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors.

Unit- 5

Parallel Programming models and tools: Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

RECOMMENDED BOOKS

- V. Rajaranam & C. S. R. Murthy, "Parallel computer"; PHI Learning.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH.
- Kai Hwang, "Advanced computer architecture", TMH.
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing.
- J. P. Hayes, "Computer Architecture and Organization"; MGH.
- Parallel Programming in C with MPI and OpenMP by M.J. Quinn, McGraw-Hill Science/Engineering/Math, 1st edition, 2003, ISBN: 0072822562.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Define classes of computers and new trends and developments in computer architecture.

CO2. Explain the advanced performance enhancement techniques such as pipelines, dynamic scheduling branch predictions, and caches.

CO3. Compare and contrast the modern computer architectures such as RISC, Scalar, and multi-CPU systems.

CO4. Critically evaluate the performance of different CPU architectures and improve the performance of applications running on different CPU architectures.

CO5. Develop and implement parallel processing models in the applications for high-performance computing systems.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	3	2	1	2	1									
CO2	3	3	1	1	1						1	1	3	3
CO3	3	3	3	2	2						1	1	3	3
CO4	3	3	3	3	2						1	1	3	3
CO5	3	3	3	3	3								3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

WIRELESS NETWORKS
290713 (DE)

COURSE OBJECTIVES

- Understand the fundamentals of wireless communication.
- Describe and differentiate between various wireless network architectures.
- Analyze wireless protocols and standards.
- Design and implement basic wireless networks.
- Evaluate the performance and security of wireless networks.
- Explore emerging trends and technologies in wireless networking.

Unit-I

Introduction to Wireless Communication: Overview of wireless communication, History and evolution of wireless networks, Applications of wireless networks, Fundamentals of Wireless Communication, Radio wave propagation, Modulation techniques, Signal encoding techniques, Propagation models: free space, two-ray ground, and log-distance path loss models, Channel models: Rayleigh fading, Rician fading, and shadowing models, Link budget analysis and system design considerations.

Unit-II

Wireless Network Architectures and Standards: Wireless Network Architectures, Infrastructure-based networks, Ad-hoc networks, Hybrid networks, Wireless Communication Standards, IEEE 802.11 (Wi-Fi), IEEE 802.15 (Bluetooth, Zigbee), Cellular networks (3G, 4G, 5G).

Unit- III

Protocols and Security: Medium Access Control (MAC) Protocols, Carrier Sense Multiple Access (CSMA),MACA (Multiple Access with Collision Avoidance),TDMA, FDMA, and CDMA, Network Layer Issues, Routing in wireless networks, Mobile IP, Ad-hoc routing protocols (AODV, DSR) Transport Layer Protocols, TCP over wireless networks, Performance issues and solutions, QoS (Quality of Service) in wireless networks, Wireless Network Security, Security threats and vulnerabilities, Encryption and authentication techniques, Security protocols (WPA, WPA2, WPA3).

Unit-IV

Performance Analysis and Specialized Networks Performance Analysis and Optimization Metrics for performance evaluation Network simulation tools, Case studies and optimization techniques, Wireless Sensor Networks (WSNs), Architecture and design of WSNs, Energy-efficient protocols, Applications of WSNs, Mobile and Pervasive Computing, Concepts of mobility, Mobile IP and Mobile TCP, Context-

aware computing.

Unit-V

Emerging Trends and Practical Applications: Internet of Things (IoT).5G and beyond, Cognitive radio networks, Practical Applications and Case Studies, Real-world applications of wireless networks, Industry case studies

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RECOMMENDED BOOKS

- "Wireless Communications & Networks" by William Stallings
- "Wireless Networking Technology: Principles, Protocols, and Applications" by Xianbin Wang, Honggang Zhang, and Min Chen
- "Wireless Communications: Principles and Practice" by Theodore S. Rappaport
- "Mobile Communications" by Jochen H. Schiller

COURSE OUTCOMES

After completion of course students will be able to:

CO1: **Understand** the fundamentals of wireless communication.

CO2: **Describe** different wireless network architectures, such as infrastructure-based, ad-hoc, and hybrid networks, and analyze their respective advantages and limitations.

CO3: **Analyze** wireless protocols, standards and emerging trends and technologies in wireless networking.

CO4: **Evaluate** the performance and security of wireless networks.

CO5: **Investigate** the architecture and design principles of wireless sensor networks (WSNs) and evaluate energy-efficient protocols for data communication in resource-constrained environments.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Department of Computer Science and Engineering

Syllabi of Open Category Course

VIIth Sem (2021 admitted)

ANNEXURE 5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Computer Networks
900222 (OC)

COURSE OBJECTIVES

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Unit-I

Introduction: Computer Network, Types- LAN, MAN & WAN,Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Transmission medium- Guided & Unguided, Cables- Twisted pair, Coaxial cable & Optical fiber, Networking devices-Repeaters, Hub, Switch, Bridge, Router, Gateway, Modem, Proxy Server, Wireless router, & Wireless Access Point (WAPs). Performance Criteria- Bandwidth, Throughput, Latency (Delay), Propagation Time, Transmission time & Queuing Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star Topology & Mesh, Switching- Circuit switching, Message switching & Packet switching, Multiplexing: FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing, Wireless transmission- Electromagnetic spectrum, Radio transmission & Microwave transmission.

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC).

Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD,CSMA/CA,IEEE 802.3 frame format.

Unit-IV

Network Layer& Transport Layer: Introduction, Design issues, Services, Routing-Distance vector routing, Hierarchical routing, Link state routing, Shortest path algorithm-Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm, Connection Oriented & Connectionless Service, Port addressing basics.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption & Compression. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Behrouz A. Forouzan "Data Communication and Networking", McGraw – Hill Publications. Andrew Tanenbaum – Computer Networks, PHI
- Peterson and Davie, "Computer Networks, A systems Approach", 5th ed., Elsevier, 2011.
- Ying-Dar Liu, Ren-Hwang, Fred Baker, "Computer Networks: An open Source Approach", McGraw – Hill, 2001.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Explain the Basic networking concepts and components of data communication system

CO2. Describe the different types of network topologies, protocols, networks devices, transmission media

CO3. Describe the functions of Network Layer and Transport Layer functions i.e. Routing Mechanism, Port addressing, Connection Management, Congestion control mechanism.

CO4. Explain the functions offered by session, presentation, and application layer and their Implementation.

CO5. Summarize the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

WEB TECHNOLOGIES

COURSE OBJECTIVES:

- To learn about the communication model and web architecture.
- To impart the design, development and implementation of Web Pages.
- To develop programs for Web using Scripting Languages.

Unit – I:

Introduction to the Internet: The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Domains, Protocols, Hypertext Transfer Protocol, Internet Protocol, IP address, MAC Address, 3-Tier web architecture, Brief Overview of OSI models, web browser, Static and Dynamic web pages.

Unit – II:

HTML: Basic Syntax of HTML, Elements, Attributes, heading, paragraph, styles, formatting, comments, colors, links, images, tables, lists, forms, media.

Unit – III:

Cascading Style Sheets: Introduction to CSS, Syntax, Selectors, Box Model, Inline, internal and External CSS, colors, borders, margin, padding z-index.

Unit – IV:

The Basics of JavaScript: Introduction to javascript, syntax, comments, variables, constants, operators, data types, objects, strings, arrays, if else, switch, loops, function.

Unit – V:

PHP&MYSQL: Introduction to php, syntax, comments, variables, echo, datatypes, strings, operators, if else, switch, loops, function, arrays, Introduction to MySQL, clauses and simple query using select, where, order by, min max, count, avg, sum, like, alias, in., How to create website using menu icon, tabs, navigations, search bar etc.

RECOMMENDED BOOKS:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India Fficient
2. Web Technologies, Black Book, dreamtech Press
3. Web Technologies, Achyut Godbole, Atul Kahate, Tata McGraw-Hill
4. Principles of Web Design, Joel Sklar, Cengage Learning

COURSE OUTCOMES: After completing the course, the student will be able to:

CO1: Distinguish among various web designing technologies for website development
CO2: Construct webpages using HTML and CSS
CO3: Model website using JavaScript and PHP
CO4: Design Static and Dynamic website
CO5: Explain the working of web pages and data retrieval

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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NAAC ACCREDITED WITH A++ GRADE

Department of Computer Science and Engineering

Experiment list/ Lab Manual for Departmental Laboratory Courses (DLC)

VIIth Sem CSE & CSD (2021 admitted)

ANNEXURE 6 & 6A

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
150701

Course Objectives

- To provide a comprehensive understanding of the R programming language, including its syntax, data structures, and key packages used for data analysis.
- To teach essential data science techniques such as data manipulation, data cleaning, data visualization, and statistical analysis using R.
- To introduce machine learning methodologies, including supervised and unsupervised learning, and show how to implement these techniques in R.

Unit 1: Introduction to R and Data Structures:
Overview of R and RStudio: installation, interface understanding, Basic operations and commands, variables, data types, operators, Data Structures: Vectors, Lists, Matrices, Arrays, Factors, Data Frames.

Unit 2: Data Manipulation and Visualization:
R packages, Installing and loading packages like dplyr, tidyr, ggplot2, Data Manipulation: filter, arrange, select, mutate, summarise, group_by, Data Cleaning: dealing with missing data, reshaping data, Data Visualization using ggplot2.

Unit 3: Statistics, Data Import/Export, and Advanced Manipulation:
Basic Statistics in R: Descriptive statistics, probability distributions, hypothesis testing, Importing and exporting data in R, Advanced Data Manipulation: Joining datasets, reshaping data, working with dates and string manipulation.

Unit 4: R Markdown and Introduction to Machine Learning :
Creating reproducible reports in R using R Markdown, Introduction to Machine Learning, Supervised Learning in R: Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines.

Unit 5: Unsupervised Learning, Time Series Analysis, and Text Mining:
Unsupervised Learning in R: K-Means Clustering, Hierarchical Clustering, Principal Component Analysis, Time Series Analysis in R, Text Mining in R: Text manipulation, sentiment analysis, topic modeling.

Recommended Books:

1. "R for Data Science" by Hadley Wickham & Garrett Grolemund.
2. "The Art of R Programming" by Norman Matloff.

Course Outcomes:
Upon successful completion of this course, students will be able :

CO 1: To Demonstrate proficiency in using R language syntax, handling data structures, and implementing key R packages.
CO 2: To Apply data manipulation and cleaning techniques in R.
CO 3: To Implement machine learning methodologies in R.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	1	2	1	1	2	1		1	1	1	1	2	3	2
CO2	2	2	1	1	2	1		1	2	1	1	2	3	3
CO3	2	2	2	3	2	1		1	3	1	2	2	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
150701

List of Experiments

1. Install R and RStudio, familiarize with the interface.
2. Practice basic operations, variable creation, and types of operators.
3. Create and manipulate different data structures.
4. Install and load R packages.
5. Perform data manipulation using dplyr.
6. Clean data using tidyr.
7. Create different types of plots using ggplot2.
8. Perform descriptive statistics and hypothesis testing.
9. Import and export data from CSV, Excel, SQL databases.
10. Practice advanced data manipulation.
11. Create a report with R Markdown.
12. Understand the concept of machine learning and its types.
13. Apply supervised learning algorithms: Linear and Logistic Regression.
14. Apply supervised learning algorithms: Decision Trees and Random Forest.
15. Apply unsupervised learning algorithms: K-Means Clustering and Hierarchical Clustering.
16. Perform Principal Component Analysis.
17. Perform Time Series Analysis in R.
18. Manipulate text data in R for sentiment analysis.
19. Implement topic modeling in R.
20. Review and final project using a combination of the techniques learned.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
150701

List of Skill-Based Mini Project

1. **Weather Data Analysis:** Obtain a weather dataset (for example, from a local weather station or an online source) and analyze patterns, visualize weather trends, and possibly predict future weather conditions using time-series analysis.
2. **Social Media Sentiment Analysis:** Use the Twitter API to fetch tweets about a particular topic and use text mining techniques to perform sentiment analysis.
3. **Stock Market Prediction:** Obtain stock market data (such as Google Finance) and use time series analysis techniques to predict future stock prices.
4. **Credit Card Fraud Detection:** Use a public anonymized credit card transaction dataset to develop a machine learning model to detect fraudulent transactions.
5. **E-commerce Customer Segmentation:** Use an e-commerce dataset to perform a customer segmentation using clustering techniques.
6. **Airbnb Data Analysis:** Analyze Airbnb data for a particular city, visualize booking trends, popular locations, and predict prices using regression analysis.
7. **Movie Recommendation System:** Create a simple movie recommendation system using a public movie rating dataset (such as MovieLens), applying both content-based and collaborative filtering methods.
8. **Spam Email Detection:** Develop a machine learning model using text mining techniques to identify spam emails from a public email dataset.
9. **Healthcare:** Predicting Heart Disease: Use a public healthcare dataset to create a machine learning model that predicts the likelihood of a patient having heart disease based on various health parameters.

10. **Retail Sales Forecasting:** Obtain a retail sales dataset and use time series analysis to forecast future sales. Apply machine learning techniques to identify factors influencing sales.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
290701

Course Objectives

- To provide a comprehensive understanding of the R programming language, including its syntax, data structures, and key packages used for data analysis.
- To teach essential data science techniques such as data manipulation, data cleaning, data visualization, and statistical analysis using R.
- To introduce machine learning methodologies, including supervised and unsupervised learning, and show how to implement these techniques in R.

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Recommended Books:

1. "R for Data Science" by Hadley Wickham & Garrett Grolemund.
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Course Outcomes:
Upon successful completion of this course, students will be able :

CO 1: To Demonstrate proficiency in using R language syntax, handling data structures, and implementing key R packages.
CO 2: To Apply data manipulation and cleaning techniques in R.
CO 3: To Implement machine learning methodologies in R.

Course Articulation Matrix

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CO1	1	2	1	1	2	1		1	1	1	1	2	3	2
CO2	2	2	1	1	2	1		1	2	1	1	2	3	3
CO3	2	2	2	3	2	1		1	3	1	2	2	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
290701

List of Experiments

1. Install R and RStudio, familiarize with the interface.
2. Practice basic operations, variable creation, and types of operators.
3. Create and manipulate different data structures.
4. Install and load R packages.
5. Perform data manipulation using dplyr.
6. Clean data using tidyr.
7. Create different types of plots using ggplot2.
8. Perform descriptive statistics and hypothesis testing.
9. Import and export data from CSV, Excel, SQL databases.
10. Practice advanced data manipulation.
11. Create a report with R Markdown.
12. Understand the concept of machine learning and its types.
13. Apply supervised learning algorithms: Linear and Logistic Regression.
14. Apply supervised learning algorithms: Decision Trees and Random Forest.
15. Apply unsupervised learning algorithms: K-Means Clustering and Hierarchical Clustering.
16. Perform Principal Component Analysis.
17. Perform Time Series Analysis in R.
18. Manipulate text data in R for sentiment analysis.
19. Implement topic modeling in R.
20. Review and final project using a combination of the techniques learned.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENTAL LAB (DATA ANALYTICS LAB)
290701

List of Skill-Based Mini Project

1. **Weather Data Analysis:** Obtain a weather dataset (for example, from a local weather station or an online source) and analyze patterns, visualize weather trends, and possibly predict future weather conditions using time-series analysis.
2. **Social Media Sentiment Analysis:** Use the Twitter API to fetch tweets about a particular topic and use text mining techniques to perform sentiment analysis.
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9. **Healthcare:** Predicting Heart Disease: Use a public healthcare dataset to create a machine learning model that predicts the likelihood of a patient having heart disease based on various health parameters.
10. **Retail Sales Forecasting:** Obtain a retail sales dataset and use time series analysis to forecast future sales. Apply machine learning techniques to identify factors influencing sales.

Department of Computer Science and Engineering

Scheme

Vth Sem CSE (2022 admitted)

ANNEXURE 7

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. V Semester *(CSE)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot										
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P				
				End Sem. Exam	^{5}Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2150511	DC	Data Science	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
2.	2150512	DC	Networking with TCP/IP	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
3.	2150513	DC	Information Security	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP	2 Hrs
4.	2150514	DC	Compiler Design	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
5.	2150519	DC	Cloud Computing and Virtualization	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2150516	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO	
7.	2150517	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	-	60	-	-	60	-	-	4	2	SO	SO	-
8.	2150518	SEMINAR SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO	-
9.	2000XXX	CLC	Novel Engaging Course	-	-	-	-	50	-	-	50	-	-	2	1	interactive	SO	-
Total				250	50	100	100	290	120	40	950	13	03	16	24			
10.	[illegible]	MAC	Disaster Management	50	10	20	20	-	-		100	2	-	-	Grade	Online	MCQ	1.5 Hrs

^{5}Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
Skills of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
		16	-	7	1	14	-	04	02	04	24
		67	-	29	4	58	-	17	8	17	Credits %

List of courses to be opted for Honors or Minor specialization in V Semester

Minor Specialization*(to be opted by students of Other Department)
Operating System Fundamentals
Computer Architecture
Programming, Data Structures and Algorithms using Python

Honors*(to be opted by students of Parent Department)	
Track1	Course
Information Security	Cyber Security and Privacy
	Ethical Hacking
IoT	Introduction to Internet of Things
	Sensor Technologies: Physics, Fabrication, and Circuits
High Performance Computing	Multi-Core Computer Architecture
	Randomized Methods in Complexity

*Course run through SWAYAM/NPTEL/MOOC Learning Based Platform

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Department of Computer Science and Engineering

Scheme

Vth Sem CSD (2022 admitted)

ANNEXURE 8

Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. V Semester *(CSD)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: $^{\$}$Proficiency in subject /course	Theory Slot: Continuous Evaluation: Mid Sem. Exam.	Theory Slot: Continuous Evaluation: Quiz/ Assignment	Practical Slot: End Sem. Exam.	Practical Slot: Continuous Evaluation: Lab Work & Sessional	Practical Slot: Continuous Evaluation: Skill Based Mini Project	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
1.	2290501	DC	Data Science	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
2.	2290502	DC	Networking with TCP/IP	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
3.	2290503	DC	Software Design & Development	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP	2 Hrs
4.	2290504	DC	Compiler Design	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
5.	2290505	DC	Design Pattern	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2290506	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO	
7.	2290507	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	-	60	-	-	60	-	-	4	2	SO	SO	-
8.	2290508	SEMINAR SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO	-
9.	2000XXX	CLC	Novel Engaging Course	-	-	-	-	50	-	-	50	-	-	2	1	interactive	SO	-
Total				250	50	100	100	290	120	40	950	13	03	16	24			
10.	[illegible]	MAC	Disaster Management	50	10	20	20	-	-		100	2	-	-	Grade	Online	MCQ	1.5 Hrs

$^{\$}$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
[illegible] / Science & [illegible] / Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
[illegible] Skills [illegible] in the V Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
		16	-	7	1	14	-	04	02	04	24
		67	-	29	4	58	-	17	8	17	Credits

List of courses to be opted for Honors or Minor specialization in V Semester

Minor Specialization* *(to be opted by students of Other Department)*
Operating System Fundamentals
Computer Architecture
Programming, Data Structures and Algorithms using Python

Honors* ***(to be opted by students of Parent Department)***	
Track1	Course
Information Security	Cyber Security and Privacy
	Ethical Hacking
IoT	Introduction to Internet of Things
	Sensor Technologies: Physics, Fabrication, and Circuits
High Performance Computing	Multi-Core Computer Architecture
	Randomized Methods in Complexity

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Department of Computer Science and Engineering

Syllabi

Vth Sem CSE (2022 admitted)

ANNEXURE 9

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATA SCIENCE
2150511 (DC)

COURSE OBJECTIVES

- To provide the fundamental knowledge of Data Sciences.
- To analyse the working of various techniques used in Data Sciences.
- To understand the basic representation and exploratory data analysis used in Data Sciences.

Unit-I

Introduction to Data Science: Introduction, Definition, applications of Data Science, Impact of Data Science, Data Analytics Life Cycle, role of Data Scientist.

Basics of Python: Essential Python libraries, Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set, Type Conversion- Operators, Decision Making: Looping-Loop Control statement, Math and Random number functions. User defined functions, function arguments & its types.

Unit-II

Vectorized Computation: The NumPy nd-array- Creating nd-arrays- Data Types for nd-arrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing, Boolean Indexing, Transposing Arrays. Universal Functions: Fast Element, Wise Array Functions, Mathematical and Statistical Methods – Sorting Unique and Other Set Logic.

Unit-III

Data Analysis: Series, Data Frame, Essential Functionality: Dropping Entries, Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis, Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

Unit-IV

Inferential Statistics in Data Science: Types of Learning, Linear Regression- Simple Linear Regression, Implementation, plotting and fitting regression line. Multiple Linear Regression, Introduction, implementation, comparison with simple linear regression, Correlation Matrix, F-Statistic, Identification of significant features. Polynomial regression.

Unit-V

Exploratory Data Analysis and Visualisation: Handling Missing Data, Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers, Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

RECOMMENDED BOOKS

1. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
3. Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig. Prentice Hall.
4. Pattern Recognition and Machine Learning, Christopher M. Bishop

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COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Define** basic concepts of Data Sciences and Python.
CO2. **Identify** various methods for the representation and manipulation of vectors.
CO3. **Analysis** of the data for applying various statistical modeling approaches.
CO4. **Develop** the skill to use statistical measures to identify significant features, evaluate model performance and perform regression analysis.
CO5. **Develop** expertise in managing missing data and assessing the impact of visualizations on data insight communication.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

NETWORKING WITH TCP/IP
2150512 (DC)

COURSE OBJECTIVES

- To understand TCP/IP Internetworking and Addressing.
- To understand framing, Routing, Address resolution and Error reporting mechanism used in the Internet
- To understand the working of Application layer protocols
- To Troubleshoot networking issues

Unit-1

TCP/IP model, Addressing- Physical, logical and port addressing, IPv4 addresses: Classful addressing, Classless addressing, Special addresses, DHCP and NAT, Subnetting and Supernetting.

Unit-2

IP Datagram- format, options, fragmentations, checksum, IPsec. Address Resolution Protocol (ARP), Reverse address resolution protocol (RARP), Internet Control message protocol (ICMP).

Unit-3

TCP: TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timers. UDP: Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing. Stream Control Transmission Protocol

Unit-4

Routing Protocols- RIP, OSPF and BGP, Application Layer: DNS, FTP, TFTP, Mail Transfer protocols, TELNET, HTTP.

Unit- 5

IPv6 Protocol, ICMPv6, IPv6 addressing, Voice over IP, RTP, SNMP, Internet security and Firewall: Internet Security, IP security, Firewall Implementation, Study of network packet analyzer tools: Wireshark, CISCO packet Tracer etc. Scanner Tools: Nmap, Nessus etc.

RECOMMENDED BOOKS

- Data and Computer Communication - W. Stalling, Pearson
- Internetworking with TCP/IP - Vol. - I - D.E. Comer, PHI
- Data Communication & Networking -B.A. Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM - W. Stalling
- LANs - Keiser

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Illustrate** the basic functionality of TCP/IP layers.

CO2. **Identify** various network layer protocol

CO3. **Analyze** the working of Transport layer protocols

CO4. **Explain** the working of Application layer protocols

CO5. **Simulate** network protocols & Topologies

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	[illegible]	[illegible]	[illegible]
CO1	1							1				2		
CO2				1			1	1		1		2		
CO3		2	2	2	2		1	1	2		1	2	3	2
CO4		2		1			1	1		1		2	2	
CO5	1	3	3	2	2			1	2	1	1	2	3	2

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INFORMATION SECURITY
2150513 (DC)

COURSE OBJECTIVES

- To provide conceptual understanding of Information security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.

Unit-I

Security: Principles and Attacks, Basic Number Theory, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: RC4, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system), Firewalls: Types, Functionality and Polices.

Unit -V

Phishing: Attacks and its Types, Buffer Overflow Attack, Session Hijacking, Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing

Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Explain** attacks, hash algorithms and authentication mechanisms.
CO2. **Illustrate** fundamentals of number theory and security principles.
CO3. **Apply** various algorithms to achieve principles of network security.
CO4. **Analyze** the cause for various existing network attacks and describe the working of available security controls.
CO5. **Examine** the vulnerabilities in IT infrastructure.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Department of Computer Science and Engineering

COMPILER DESIGN

2150514 (DC)

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Compiler Design Tools.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation, Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Syntax and Semantic Errors.

Department of Computer Science and Engineering

CLOUD COMPUTING AND VIRTUALIZATION
2150519(DC)

Course Objectives:

1. To Provide the basics of cloud computing concepts along with virtualization techniques.
2. To provide overview of the field of Cloud Computing, and an in-depth study into its enabling technologies and main building blocks.
3. To develop the skills needed to become a practitioner or carry out research projects in this domain.

Unit I - Introduction:

Definition and evolution of cloud computing, Cloud components, Essential characteristics, advantages and limitations of cloud computing, Issues in cloud computing, Virtualization: Need of virtualization, Features of Virtualization, limitations, Classification of virtualization: Hardware virtualization, Desktop virtualization.

Unit II – Virtualization Concepts:

Server Virtualization: Introduction, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types, Utility Computing, Elastic Computing, Virtualization applications in enterprises, Pitfalls of virtualization, Multitenant software, Virtualization security management, Datacenter Virtualization, Client Virtualization, Cloud Virtualization.

Unit III – Cloud Architecture:

Cloud architecture, Layers in cloud architecture, Service Models: Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Application as a Service, Functions as a Service, features and benefits of each. Deployment Models: Public clouds, Private clouds, Community clouds, Hybrid clouds.

Unit IV – Cloud Storage & Security:

Introduction to Storage Systems, Data in the cloud: Relational databases, Cloud Storage Concepts, Cloud file systems: GFS and HDFS, Cloud Databases (HBase, MongoDB, Cassandra, DynamoDB), Cloud Object Storage, Features and functions of cloud computing platforms, Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud: Cloud computing security architecture.

Unit V – Tools and Techniques

Distributed Programming for the Cloud,Map-Reduce and extensions: Parallel computing, The Map-Reduce model, Example/Application of MapReduce, Introduction to Simulators, CloudSim simulator, GreenCloud simulator, VMWare Simulator, Oracle Virtual Box. Case Study: AWS

Reference Books:-

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
- Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing", Elseveir publication, 2012
- David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach

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COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Build** the fundamental ideas behind Cloud Computing, the evolution of the paradigm, and introduce the virtualization concepts
CO2. **Understand** ideas and principles of Virtualization and its applications.
CO3. **Describe** fundamental concepts of cloud infrastructures and Service Oriented Architecture.
CO4. **Illustrate** the fundamental concepts of cloud storage and cloud security.
CO5. **Study** of various tools and technologies for implementing applications of Cloud.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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NAAC ACCREDITED WITH A++ GRADE

Department of Computer Science and Engineering

Syllabi

Vth Sem CSD (2022 admitted)

ANNEXURE 10

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATA SCIENCE
2290501(DC)

COURSE OBJECTIVES

- To provide the fundamental knowledge of Data Sciences.
- To analyse the working of various techniques used in Data Sciences.
- To understand the basic representation and exploratory data analysis used in Data Sciences.

Unit-I

Introduction to Data Science: Introduction, Definition, applications of Data Science, Impact of Data Science, Data Analytics Life Cycle, role of Data Scientist.

Basics of Python: Essential Python libraries, Python Introduction- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set, Type Conversion- Operators, Decision Making: Looping-Loop Control statement, Math and Random number functions, User defined functions, function arguments & its types.

Unit-II

Vectorized Computation: The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing, Boolean Indexing, Transposing Arrays. Universal Functions: Fast Element, Wise Array Functions, Mathematical and Statistical Methods – Sorting Unique and Other Set Logic.

Unit-III

Data Analysis: Series, DataFrame, Essential Functionality: Dropping Entries, Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis, Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

Unit-IV

Inferential Statistics in Data Science: Types of Learning, Linear Regression- Simple Linear Regression, Implementation, plotting and fitting regression line. Multiple Linear Regression, Introduction, implementation, comparison with simple linear regression, Correlation Matrix, F-Statistic, Identification of significant features. Polynomial regression.

Unit-V

Exploratory Data Analysis and Visualisation: Handling Missing Data, Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers, Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

RECOMMENDED BOOKS

- Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
- David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
- Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Pattern Recognition and Machine Learning, Christopher M. Bishop

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COURSE OUTCOMES

After completing the course, the student will be able to:

CO1. **Define** basic concepts of Data Sciences.
CO2: **Illustrate** various concepts of python that are used in data sciences.
CO3: **Identify** various methods for the representation and manipulation of vectors.
CO4: **Analysis** the data for applying various statistical modelling approaches.
CO5: **Identify** hidden patterns in data and transform it using data science techniques.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

NETWORKING WITH TCP/IP
2290502(DC)

COURSE OBJECTIVES

- To understand TCP/IP Internetworking and Addressing.
- To understand framing, Routing, Address resolution and Error reporting mechanism used in the Internet
- To understand the working of Application layer protocols
- To Troubleshoot networking issues

Unit-1

TCP/IP model, Addressing- Physical, logical and port addressing, IPv4 addresses: Classful addressing, Classless addressing. Special addresses, DHCP and NAT. Subnetting and Supernetting.

Unit-2

IP Datagram- format, options, fragmentations, checksum, IPsec. Address Resolution Protocol (ARP), Reverse address resolution protocol (RARP). Internet Control message protocol (ICMP).

Unit-3

TCP: TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timers. UDP: Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing. Stream Control Transmission Protocol

Unit-4

Routing Protocols- RIP, OSPF and BGP, Application Layer: DNS, FTP, TFTP, Mail Transfer protocols, TELNET, HTTP.

Unit- 5

IPv6 Protocol, ICMPv6, IPv6 addressing, Voice over IP, RTP, SNMP, Internet security and Firewall: Internet Security, IP security, Firewall Implementation, Study of network packet analyzer tools: Wireshark, CISCO packet Tracer etc. Scanner Tools: Nmap, Nessus etc.

RECOMMENDED BOOKS

- Data and Computer Communication - W. Stalling, Pearson
- Internetworking with TCP/IP - Vol. - I - D.E. Comer, PHI
- Data Communication & Networking -B.A. Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM - W. Stalling
- LANs - Keiser

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Illustrate** the basic functionality of TCP/IP layers.

CO2. **Identify** various network layer protocol

CO3. **Analyze** the working of Transport layer protocols

CO4. **Explain** the working of Application layer protocols

CO5. **Simulate** network protocols & Topologies

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COMPILER DESIGN

2290504 (DC)

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting. Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Compiler Design Tools.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of Expression, Control, Structures, Conditional Statements, Various Intermediate Code Forms, Syntax Directed Translation, Memory Allocation and Symbol Table Organizations, Static and Dynamic Array Allocation, String Allocation, Structure Allocation etc., Error Detection Indication and Recovery, Syntax and Semantic Errors.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN PATTERNS
2290505 (DC)

COURSE OBJECTIVES

- To provide the fundamental concepts and principles of design patterns in software development.
- Explore the different types of design patterns and their classifications: creational, structural, and behavioral.
- Learn how to analyze and identify design pattern opportunities in software design and architecture.

Unit-I

Introduction to Design Patterns: Overview of design patterns, Importance of design patterns in software development, Types of design patterns: creational, structural, and behavioral, UML diagrams for design patterns, Common design principles and SOLID principles.

Unit-II

Creational Design Patterns: Singleton pattern: Definition and purpose of the Singleton pattern, single instance and global access, Case study, Factory pattern: Factory pattern and its role in creating objects, Abstract factory pattern: Abstract Factory pattern using interfaces and abstract classes, Builder pattern, Prototype pattern.

Unit-III

Structural Design Patterns: Adapter pattern: Definition and purpose of the Adapter pattern, interfaces and the need for adaptation, Decorator pattern: Decorator pattern and its role in dynamically adding behavior to objects, Facade pattern: interface to a complex subsystem, Composite pattern: Composite pattern using component and leaf classes, recursive and non-recursive traversal techniques, Bridge pattern: decoupling abstractions from their implementations.

Unit-IV

Behavioral Design Patterns: Observer pattern: subject and observer interfaces, Strategy pattern: strategy interfaces and concrete strategies, Template method pattern: Template Method pattern using abstract classes and concrete implementations, Case study, Command pattern: encapsulating requests as objects, decoupling requesters and receivers, State pattern: state interfaces, concrete states, and context objects.

Unit-V

Advanced Design Patterns: Iterator pattern: iterator interfaces and concrete iterators, Proxy pattern: surrogate or placeholder for another object, Mediator pattern: mediator interfaces and concrete mediators, Visitor pattern: visitor interfaces, concrete visitors, and visitable objects. Memento pattern: memento objects, originator objects, and caretaker objects.

RECOMMENDED BOOKS

- "Head First Design Patterns" by Eric Freeman, Elisabeth Robson, Bert Bates, and Kathy Sierra.
- "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides
- "Design Patterns Explained: A New Perspective on Object-Oriented Design" by Alan Shalloway and James Trott
- "Design Patterns in Java" by Steven John Metsker and William C. Wake
- "Design Patterns in Python" by Rahul Verma
- "Modern C++ Design: Generic Programming and Design Patterns Applied" by Andrei Alexandrescu

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COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Identify** and classify design patterns based on their purpose and characteristics.
CO2. **Implement** design patterns using appropriate programming languages and frameworks.
CO3. **Analyze** software design problems and select appropriate design patterns to address them.
CO4. **Understand** and adhere to best practices when utilizing design patterns in software development.
CO5. **Evaluate** the effectiveness and efficiency of design pattern implementations in software projects.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SOFTWARE DESIGN & DEVELOPMENT
2290509(DC)

COURSE OBJECTIVES

- To understand the nature of software design process models, SCRUM and Agile practices.
- Develop skills in creating and analyzing software design artifacts such as UML diagrams.
- Manage software development projects through effective planning and scheduling techniques.
- To understand concept of software quality assurance and risk management process.

Unit-I

Introduction to Software Design Process Models: Software design process models, Iterative, Incremental, Agile practices. Characteristics of software projects, project attributes, project constraints, project baseline, project charter, Stakeholders, Feasibility Study, Cost-benefit Analysis.

Unit-II

Software Design & Development Approaches: Importance of software design, Software development life cycle, Principles of good design, Structural View, Class Diagrams, Dynamic behavioral view, Sequence diagrams, UML diagrams, Project and Product Life Cycles, role of project manager, System view of project management, Barry Boehm: W5HH principle

Unit- III

Fundamentals of Agile & Agile Scrum Framework: Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Lean Software, Agile project management, Design and development practices in Agile projects, Agile Tools, Problem Agile Solves, Introduction to Scrum, Project phases Product backlog, Sprint backlog, Iteration planning, Scrum and Kanban. User story definition, Characteristics and content of user stories, Burn down chart, Sprint planning,

Unit-IV

Techniques of Project Scheduling: Work Breakdown Structure (WBS), activities sequencing, network diagrams, activity duration estimation, schedule development, Gantt Charts, Critical path method (CPM), Program evaluation & review technique (PERT), concept of slack time, schedule control.

Unit-V

Quality and Risk Management: Cost budgeting, cost control, earned value management, project

portfolio management. Project Quality Management: Quality Planning, quality Assurance, Quality control, Tool & techniques for quality control. Pareto Analysis, Six Sigma. CMM, ISO Standards, Juran Methodology, Human Resource Management, responsibility assignment metrics, resource loading, resource levelling, Risk Management planning, Expected Monetary Value, Decision tree, Releases vs. version.

RECOMMENDED BOOKS

- Bob Hughes, Mike Cottrell and Rajib Mall, Software Project Management (5'" cd.), Tata McGraw Hill, 2009. ISBN 978-0071072748.
- Cooperative Software Development – Dr. Amy Ko.
- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.

COURSE OUTCOMES

After completion of course students will be able to:

CO1: **Identify** software design process models and its applications
CO2: **Investigate** various software design & development approaches.
CO3. **Execute** Agile practices in software projects such as scrum and sprints
CO4: **Implement** Project Scheduling techniques such as CPM and PERT.
CO5: **Recognize** Quality Assurance and Control Techniques and investigate the Risks involved in software design & development.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Department of Computer Science and Engineering

Experiment list/ Lab manual

Vth Sem CSE & CSD (2022 admitted)

ANNEXURE 11 & 11A

DATA SCIENCE
2150511 (DC)

List of Experiments

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set
2. Solve problems using decision and looping statements.
3. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
4. Handle numerical operations using math and random number functions.
5. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
6. Computation on NumPy arrays using Universal Functions and Mathematical methods.
7. Import a CSV file and perform various Statistical and Comparison operations on rows/columns.
8. Create Pandas Series and DataFrame from various inputs.
9. Import any CSV file to Pandas DataFrame and perform the following:
    1. Visualize the first and last 10 records
    2. Get the shape, index and column details
    3. Select/Delete the records(rows)/columns based on conditions.
    4. Perform ranking and sorting operations.
    5. Do required statistical operations on the given columns.
    6. Find the count and uniqueness of the given categorical values.
    7. Rename single/multiple columns.
10. Import any CSV file to Pandas DataFrame and perform the following:
    1. Handle missing data by detecting and dropping/ filling missing values.
    2. Transform data using different methods.
    3. Detect and filter outliers.
    4. Perform Vectorized String operations on Pandas Series.
    5. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.
11. Use the scikit-learn package in python to implement the regression model and its related methods.

INFORMATION SECURITY
2150513 (DC)

List of Experiments

1. Perform encryption, decryption using the following substitution techniques I. Ceaser cipher II. Hill Cipher
2. Perform encryption and decryption using following transposition techniques Rail fence - Row & Column Transformation
3. Implement Playfair Cipher with key entered by user.
4. Implement polyalphabetic Cipher
5. Implement AutoKey Cipher
6. Implement Hill Cipher.
7. Implement Rail fence technique
8. Implement Transposition technique
9. Implement substitution technique
10. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

DATA SCIENCE
2290501(DC)

List of Experiments

1. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set
2. Solve problems using decision and looping statements.
3. Apply Python built-in data types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem
4. Handle numerical operations using math and random number functions.
5. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
6. Computation on NumPy arrays using Universal Functions and Mathematical methods.
7. Import a CSV file and perform various Statistical and Comparison operations on rows/columns.
8. Create Pandas Series and DataFrame from various inputs.
9. Import any CSV file to Pandas DataFrame and perform the following:
    1. Visualize the first and last 10 records
    2. Get the shape, index and column details
    3. Select/Delete the records(rows)/columns based on conditions.
    4. Perform ranking and sorting operations.
    5. Do required statistical operations on the given columns.
    6. Find the count and uniqueness of the given categorical values.
    7. Rename single/multiple columns.
10. Import any CSV file to Pandas DataFrame and perform the following:
    1. Handle missing data by detecting and dropping/ filling missing values.
    2. Transform data using different methods.
    3. Detect and filter outliers.
    4. Perform Vectorized String operations on Pandas Series.
    5. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.
11. Use the scikit-learn package in python to implement the regression model and its related methods.

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Department of Computer Science and Engineering

Skill Based Mini-Project

Vth Sem CSE & CSD (2022 admitted)

ANNEXURE 12 & 12A

DATA SCIENCE
2150511 (DC)

List of skill-based mini project

1. Exploratory Data Analysis (EDA): Perform an in-depth analysis of a dataset, including data cleaning, visualization, and statistical analysis to gain insights and understand the underlying patterns and relationships.
2. Predictive Modeling: Build a machine learning model to predict a specific outcome or target variable based on a given dataset. This could include classification, regression, or time series forecasting tasks.
3. Natural Language Processing (NLP): Develop a text classification or sentiment analysis model using techniques such as tokenization, word embeddings, and recurrent neural networks (RNNs) to analyze and understand text data.
4. Image Recognition: Create an image recognition system using convolutional neural networks (CNNs) to classify or identify objects, faces, or patterns in images.
5. Recommendation System: Build a recommendation engine that suggests personalized recommendations to users based on their preferences and behavior, using collaborative filtering or content-based filtering techniques.
6. Clustering Analysis: Implement clustering algorithms such as k-means, hierarchical clustering, or DBSCAN to group similar data points together and discover hidden patterns or segments within a dataset.
7. Time Series Analysis: Analyze time-dependent data, such as stock prices or weather data, using techniques like autoregressive integrated moving average (ARIMA), exponential smoothing, or recurrent neural networks (RNNs).
8. Anomaly Detection: Develop an anomaly detection system that can identify unusual or suspicious patterns in data, which can be useful for fraud detection, network intrusion detection, or outlier detection.
9. Social Media Sentiment Analysis: Use data from social media platforms to analyze public sentiment towards specific topics, brands, or events using natural language processing techniques and sentiment analysis algorithms.
10. Data Visualization Dashboard: Create an interactive dashboard using libraries like Plotly or Dash to visualize and explore data, providing users with an intuitive interface to interact with and gain insights from the data.

Please Note: *Each project has to be submitted by a group of 3 to 4 students, and each group will be assigned only one project.*

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INFORMATION SECURITY
2150513 (DC)

List of skill-based mini project

1. Develop an email monitoring system.
2. Develop a web application firewall
3. Develop a Log Analyzer
4. Develop a Malware Analysis Sandbox
5. Develop an Encryption Software
6. Develop a Caesar code Decoder
7. Develop a user authentication system
8. Develop an Image Steganography system
9. Develop an Anomaly detection system

DATA SCIENCE
2290501(DC)

List Skill Based Mini-Projects

1. Exploratory Data Analysis (EDA): Perform an in-depth analysis of a dataset, including data cleaning, visualization, and statistical analysis to gain insights and understand the underlying patterns and relationships.
2. Predictive Modeling: Build a machine learning model to predict a specific outcome or target variable based on a given dataset. This could include classification, regression, or time series forecasting tasks.
3. Natural Language Processing (NLP): Develop a text classification or sentiment analysis model using techniques such as tokenization, word embeddings, and recurrent neural networks (RNNs) to analyze and understand text data.
4. Image Recognition: Create an image recognition system using convolutional neural networks (CNNs) to classify or identify objects, faces, or patterns in images.
5. Recommendation System: Build a recommendation engine that suggests personalized recommendations to users based on their preferences and behavior, using collaborative filtering or content-based filtering techniques.
6. Clustering Analysis: Implement clustering algorithms such as k-means, hierarchical clustering, or DBSCAN to group similar data points together and discover hidden patterns or segments within a dataset.
7. Time Series Analysis: Analyze time-dependent data, such as stock prices or weather data, using techniques like autoregressive integrated moving average (ARIMA), exponential smoothing, or recurrent neural networks (RNNs).
8. Anomaly Detection: Develop an anomaly detection system that can identify unusual or suspicious patterns in data, which can be useful for fraud detection, network intrusion detection, or outlier detection.
9. Social Media Sentiment Analysis: Use data from social media platforms to analyze public sentiment towards specific topics, brands, or events using natural language processing techniques and sentiment analysis algorithms.
10. Data Visualization Dashboard: Create an interactive dashboard using libraries like Plotly or Dash to visualize and explore data, providing users with an intuitive interface to interact with and gain insights from the data.

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NAAC ACCREDITED WITH A++ GRADE

Department of Computer Science and Engineering

scheme

IIIrd Sem CSE (2023 admitted)

ANNEXURE 13

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
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Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. III Semester *(CSE)*

(for batch admitted in academic session 2023-24)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: $Proficiency in subject /course	Theory Slot: Continuous Evaluation: Mid Sem. Exam.	Theory Slot: Continuous Evaluation: Quiz/ Assignment	Practical Slot: End Sem. Exam.	Practical Slot: Continuous Evaluation: Lab Work & Sessional	Practical Slot: Continuous Evaluation: Skill Based Mini Project	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
1.	3150301	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
2.	3150302	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	3150303	DC	Design & Analysis of Algorithms	50	10	20	20	40	30	30	260	2	1	2	4	Blended	PP	2 Hrs
4.	3150304	DC	Database Management System	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
5.	3150309	DC	Python Programming	50	10	20	20	-	-	-	100	2	1	-	3	Blended	AO	2 Hrs
6.	3150310	DLC	Problem solving using Python Lab	-	-	-	-	40	30	30	100	-	-	2	1	offline	SO	
7.	3150307	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO	-
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
9.	3150308	DLC	Skill Internship Project (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
			Total	**250**	**50**	**100**	**100**	**230**	**130**	**90**	**950**	**11**	**05**	**14**	**23**			
10.	1000005	MAC	Project Management & Financing	50	10	20	20				100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	3000004	Natural Science & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question AO: Assignment – Oral PP: Pen Paper SO: Submission – Oral

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
		16	-	6	1	15	03	-	01	04	23
		70	-	26	4	65.5	13	-	4	17.5	Credits %

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Department of Computer Science and Engineering

scheme

IIIrd Sem CSD (2023 admitted)

ANNEXURE 14

Department of Computer Science and Engineering
Scheme of Evaluation
B. Tech. III Semester *(CSD)*

(for batch admitted in academic session 2023-24)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot										
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P				
				End Sem. Exam	[3]Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	3290301	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
2.	3290302	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	3290303	DC	Design & Analysis of Algorithms	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
4.	3290304	DC	Database Management System	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
5.	3290309	DC	Python Programming	50	10	20	20	-	-	-	100	2	1	-	3	Blended	AO	2 Hrs
6.	3290310	DLC	Problem solving using Python Lab	-	-	-	-	40	30	30	100	-	-	2	1	offline	SO	
7.	3290307	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO	-
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
9.	3290308	DLC	Skill Internship Project (Institute Level)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
Total				250	50	100	100	230	130	90	950	11	5	14	23			
10.	1000005	MAC	Project Management & Financing	50	10	20	20				100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	1000004	Natural Science & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

*Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language
Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	SIP/SLP/NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	AO	MCQ	SO	SO	
		Offline	Online								
		16	-	6	1	15	03	-	01	04	23
		70	-	26	4	65.5	13	-	4	17.5	Credits %

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Department of Computer Science and Engineering

Syllabi

IIIrd Sem CSE (2023 admitted)

ANNEXURE 15

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS
3150302 (DC)

COURSE OBJECTIVES

- Provide basic knowledge of computer operating system structures and functioning.
- Compare several different approaches to memory management, file management and process management
- Understand various problems related to concurrent operations and their solutions.

Unit- I

Basics of operating systems: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.
Process management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit-II

Process synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.
Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit-III

Memory management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit-IV

Storage management: Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, RAID Structure.

Unit-V

File system interface: File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.
System Protection: Goals, Principles, Domain of Protection, Access Matrix, Access Control.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, Internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. **Outline** the basic concept of operating systems
CO2. **Analyze** the working of operating system
CO3. **Examine** the working of various scheduling/allocation approaches
CO4. **Measure** the performance of various scheduling/allocation approaches
CO5. **Develop** the Solution of various operating system problems/issues

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1	3	3	3	3	3	1	2	1	1	1	1	3	3	3
CO2	3	3	3	3	3	1	1	1	1	1	1	3	3	3
CO3	3	3	3	3	3	2	1	1	1	1	1	3	3	3
CO4	3	3	2	3	2	1	1	1	1	1	1	3	3	3
CO5	3	3	3	3	2	1	1	1	1	1	1	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN & ANALYSIS OF ALGORITHMS
3150303 (DC)

COURSE OBJECTIVE:

- To introduce the topic of algorithms as a precise mathematical concept.
- To demonstrate the familiarity with major algorithm design paradigms and methods of analysis.
- To design efficient algorithms for common computer engineering problems.
- To enhance the skills using well-known algorithms and data structures for solving real-life problems.

Unit-I

Introduction to Computational Model: RAM model, Algorithms and its importance. Recurrences and Asymptotic Notations, Growth of function, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, Basic Tree and Graph Concept: Binary Search Trees, Height Balanced Tree, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the maximum and minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, greedy activity selection. **Minimum Cost Spanning Trees**: Prim's and Kruskal's Algorithm, knapsack Problem, Single Source Shortest Path: Dijkstra's single source shortest path algorithm, Huffman Coding.

Unit-IV

Dynamic Programming: Introduction, The principle of Optimality, Examples of Dynamic Programming Methods such 0/1 Knapsack, Travelling salesman problem, Floyds All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch and Bound**: Introduction and its Examples like – Travelling
Salesperson Problem etc. **NP Completeness**: Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete problem.

RECOMMENDED BOOKS:

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
- Introduction to Algorithms, Coreman Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullman, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES:

After Completion of this course, the students would be able to:

CO1: **Tell** the basic features of an Algorithms.

CO2: **Outline** major Algorithms and Data Structures.

CO3: **Apply** various algorithmic design paradigms.

CO4: **Compare** different design techniques to develop algorithms for computational problems.

CO5: **Design** algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
2150304 (DC)(old)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints. Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc.Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Define** the terminology, features, classifications, and characteristics embodied in database systems.

CO2. **Identify** different issues involved in the design and implementation of database system.

CO3. **Analyse** database schema for a given problem domain.

CO4. **Justify** principles for logical design of databases, including the E-R modelling and Normalization approach.

CO5. **Apply** transaction processing concepts and recovery methods over real time data.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints. Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc.Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools, Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Explain the terminology, features, classifications, characteristics, and data models embodied in database systems.

CO2. Describe the concepts related to the data modeling techniques, relational database model and relational algebra.

CO3. Apply the SQL commands over a given relational schema.

CO4. Analyze database schema to apply normalization technique for schema refinement.

CO5. Apply the transaction processing concepts and recovery methods over a real-time database system.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PYTHON PROGRAMMING
3150309 (DC)

Course Objectives:

- To understand the fundamental concepts of Python.
- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Brief Introduction, Advantages, Disadvantages, Application, Python interpreter, Python Syntax, Comments, Variables, Data Types, Operators (unary, arithmetic, etc.), expressions, and statements (Assignment statements, Conditional statements, etc.), Numbers, Strings and string operations, Type Casting, Booleans

Unit II

Built-in data type: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.)
Control Statements: If statement, Elif statement, Else Statement, While Loop, For Loop (String and Number), break statement, Continue statement

Unit III

User defined Functions: Create, Call, Arguments, Types of arguments, Pass function, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in a Module, In-Built Functions, Recursion, Lambda function **Classes, and Objects:** Python Object Oriented Programming, Create class and object, Self-parameter, Scope

Unit IV

Files and Exceptions: Creating, Reading, updating, and deleting Files, File Operations, Assertions, **Exceptions**: Try and Except, user-defined Exception, Built-in exception **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Modularization: Introduction to Python Modules, Standard Modules, create, Import, and use. **Packages:** Packages, PIP, Introduction to Python GUI packages **Graphical User Interfaces:** Event-Driven Programming Paradigm: Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames.

RECOMMENDED BOOKS

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: Recognize Python basic functions, operators, and Syntax.

CO2: Implement Python built-in functions and control statements.

CO3: Implement Python user-defined functions and classes.

CO4: Summarize file and exception handling in Python.

CO5: Create Python GUI.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)

Course Objectives:

- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Setting up the Python environment (Anaconda, Jupyter Notebook), Basic syntax usage: variables, data types, and operators, First Python program, **Control Structures:** Conditional statements: if, elif, else, Looping constructs: for and while loops Nested control structures

Unit II

List/ Set/ Tuple operations: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.) **Strings:** Reverse, Palindrome, Character count, Replacing Character

Unit III

Matrix and Array: Define matrix and print, Arithmetic operation between Matrix,
Functions and Modules implementation: Defining and calling functions, Function parameters and return values, Scope and lifetime of variables, Importing and using modules, In-Built Functions, Recursion, Lambda function

Unit IV

Classes, and Objects: Create class and object, Self-parameter, Attribut and methods, Implement Inheritance and polymorphism.
File Handling: Read and write to files, Working with CSV and JSON file, Implement try-except blocks, Debug a piece of code

Unit V

GUI: Work with Canvas, draw geometric shapes, Fill colour, Creating Simple GUI, GUI packages, Tkinter, Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames, Widget window – Bg, Bd, Cursor, font, Fg, Command, Minimal Application

Reference Books

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

Course Outcome

CO1: Implement Python built-in functions and control statements.
CO2: Implement Python user-defined functions and classes.
CO3: Create Python GUI.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	3	1	1	1	1	1	1	3	3	-
CO2	3	3	3	2	3	1	1	1	1	1	1	3	3	-
CO3	2	2	3	3	3	1	1	1	2	3	3	3	3	-

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed to be University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A++ GRADE

Department of Computer Science and Engineering

Syllabi

IIIrd Sem CSD (2023 admitted)

ANNEXURE 16

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS
3290302 (DC)

COURSE OBJECTIVES

- Provide basic knowledge of computer operating system structures and functioning.
- Compare several different approaches to memory management, file management and process management
- Understand various problems related to concurrent operations and their solutions.

Unit- I

Basics of operating systems: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.
Process management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit-II

Process synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.
Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit-III

Memory management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit-IV

Storage management: Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, RAID Structure.

Unit-V

File system interface: File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.
System Protection: Goals, Principles, Domain of Protection, Access Matrix, Access Control.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, Internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition, Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. Outline the basic concept of operating systems
CO2. Analyze the working of operating system
CO3. Examine the working of various scheduling/allocation approaches
CO4. Measure the performance of various scheduling/allocation approaches
CO5. Analyze the various operating system problems/issues

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN & ANALYSIS OF ALGORITHMS
3290303 (DC)

COURSE OBJECTIVE:

- To introduce the topic of algorithms as a precise mathematical concept.
- To demonstrate the familiarity with major algorithm design paradigms and methods of analysis.
- To design efficient algorithms for common computer engineering problems.
- To enhance the skills using well-known algorithms and data structures for solving real-life problems.

Unit-I

Introduction to Computational Model: RAM model, Algorithms and its importance, Recurrences and Asymptotic Notations, Growth of function, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, Basic Tree and Graph Concept: Binary Search Trees, Height Balanced Tree, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the maximum and minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, greedy activity selection. **Minimum Cost Spanning Trees**: Prim's and Kruskal's Algorithm, knapsack Problem, Single Source Shortest Path: Dijkstra's single source shortest path algorithm, Huffman Coding.

Unit-IV

Dynamic Programming: Introduction, The principle of Optimality, Examples of Dynamic Programming Methods such 0/1 Knapsack, Travelling salesman problem, Floyds All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch and Bound**: Introduction and its Examples like – Travelling

Salesperson Problem etc. **NP Completeness**: Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete problem.

RECOMMENDED BOOKS:

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
- Introduction to Algorithms, Coreman Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullman, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES:
After Completion of this course, the students would be able to:

CO1: Tell the basic features of an Algorithms.
CO2: Outline major Algorithms and Data Structures.
CO3: Apply various algorithmic design paradigms.
CO4: Analyze the asymptotic performance of Algorithms.
CO5: Compare different design techniques to develop algorithms for computational problems.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
2290304 (DC) (Old)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.
Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc.Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Define the terminology, features, classifications, and characteristics embodied in database systems.

CO2. Identify different issues involved in the design and implementation of database system.

CO3. Justify principles for logical design of databases, including the E-R modeling and Normalization approach.

CO4. Apply transaction processing concepts and recovery methods over real time data.

CO5. Formulate, using relational algebra and SQL, solutions to a broad range of query Problems.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3290304 (DC) (New)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.
Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc.Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools. Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Explain the terminology, features, classifications, characteristics, and data models embodied in database systems.

CO2. Describe the concepts related to the data modeling techniques, relational database model and relational algebra.

CO3. Apply the SQL commands over a given relational schema.

CO4. Analyze database schema to apply normalization technique for schema refinement.

CO5. Apply the transaction processing concepts and recovery methods over a real-time database system.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PYTHON PROGRAMMING
3290309 (DC)

Course Objectives:

- To understand the fundamental concepts of Python.
- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Brief Introduction, Advantages, Disadvantages, Application, Python interpreter, Python Syntax, Comments, Variables, Data Types, Operators (unary, arithmetic, etc.), expressions, and statements (Assignment statements, Conditional statements, etc.), Numbers, Strings and string operations, Type Casting, Booleans

Unit II

Built-in data type: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.)
Control Statements: If statement, Elif statement, Else Statement, While Loop, For Loop (String and Number), break statement, Continue statement

Unit III

User defined Functions: Create, Call, Arguments, Types of arguments, Pass function, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in a Module, In-Built Functions, Recursion, Lambda function **Classes, and Objects:** Python Object Oriented Programming, Create class and object, Self-parameter, Scope

Unit IV

Files and Exceptions: Creating, Reading, updating, and deleting Files, File Operations, Assertions, **Exceptions**: Try and Except, user-defined Exception, Built-in exception **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Modularization: Introduction to Python Modules, Standard Modules, create, Import, and use. **Packages**: Packages, PIP, Introduction to Python GUI packages **Graphical User Interfaces:** Event-Driven Programming Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames.

RECOMMENDED BOOKS

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: Recognize Python basic functions, operators, and Syntax.
CO2: Implement Python built-in functions and control statements.
CO3: Implement Python user-defined functions and classes.
CO4: Summarize file and exception handling in Python.
CO5: Create Python GUI.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3290310(DLC)

Course Objectives:

- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Setting up the Python environment (Anaconda, Jupyter Notebook), Basic syntax usage: variables, data types, and operators, First Python program, **Control Structures:** Conditional statements: if, elif, else, Looping constructs: for and while loops Nested control structures

Unit II

List/ Set/ Tuple operations: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.) **Strings:** Reverse, Palindrome, Character count, Replacing Character

Unit III

Matrix and Array: Define matrix and print, Arithmetic operation between Matrix,
Functions and Modules implementation: Defining and calling functions, Function parameters and return values, Scope and lifetime of variables, Importing and using modules, In-Built Functions, Recursion, Lambda function

Unit IV

Classes, and Objects: Create class and object, Self-parameter, Attribut and methods, Implement Inheritance and polymorphism.
File Handling: Read and write to files, Working with CSV and JSON file, Implement try-except blocks, Debug a piece of code

Unit V

GUI: Work with Canvas, draw geometric shapes, Fill colour, Creating Simple GUI, GUI packages, Tkinter, Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames, Widget window – Bg, Bd, Cursor, font, Fg, Command, Minimal Application

Reference Books

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

Course Outcome

CO1: Implement Python built-in functions and control statements.

CO2: Implement Python user-defined functions and classes.

CO3: Create Python GUI.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	3	3	3	1	3	1	1	1	1	1	1	3	3	-
	3	3	3	2	3	1	1	1	1	1	1	3	3	-
CO3	2	2	3	3	3	1	1	1	2	3	3	3	3	-

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed to be University
(Declared under Distinct Category by Ministry of Education, Government of India)
NAAC ACCREDITED WITH A+ GRADE

Department of Computer Science and Engineering

Experiment List/ Lab Manual And Skill-Based Mini Projects

IIIrd Sem CSE & CSD (2023 admitted)

ANNEXURE 17 & 17A

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN AND ANALYSIS OF ALGORITHM
3150303
List of Experiments

1. WAP to implement the following using array as data structure and analyze its time Complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Bucket sort f. Radix sort g. Heap sort h. Merge sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time Complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

List of Experiments

1. Introduction to Structure Query Language (SQL)
   a) Overview of SQL
   b) Various Data Types in SQL
   c) Various Commands in SQL
   d) Various Constraints in SQL
2. Implementation of DDL commands of SQL with suitable examples
   a) Create table
   b) Alter table
   c) Drop table
3. Implementation of DML commands of SQL with suitable examples
   a) Insert
   b) Update
   c) Delete
4. Study and implementation of different types of constraints.
5. Implementation of different types of functions with suitable examples
   a) Number function
   b) Aggregate function
   c) Character function
   d) Conversion function
6. Implementation of different types of operators in SQL
   a) Arithmetic operators
   b) Logical operators
   c) Comparison operators
   d) Set operation
7. Implementation of different types of joins
   a) Inner join
   b) Outer join
   c) Natural join
8. Study and implementation of
   a) Group by and having clause
   b) Order by clause
   c) Indexing
9. Study and implementation of
   a) Sub-queries
   b) Views
10. Study and implementation of Database Backup and Recovery commands.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)
List of Experiments

1. Python Program to
    a. Generate a Random Number
    b. Convert Kilometers to Miles
    c. Check if a Number is Positive, Negative or 0
    d. Print the Fibonacci sequence
    e. Find ASCII Value of Character
    f. Shuffle Deck of Cards
    g. Display Calendar
2. Python Program to
    a. Display the Fibonacci Sequence Using Recursion
    b. Find the Sum of Natural Numbers Using Recursion
    c. Find the Factorial of Number Using Recursion
    d. Convert Decimal to Binary Using Recursion
3. Python Program to Add Two Matrices, Transpose a Matrix, Multiply Two Matrices
4. Python Program to
    a. Check Whether a String is Palindrome or Not
    b. Remove Punctuations from a String
    c. Sort Words in Alphabetic Order
5. Python Program to Illustrate Different Set, Tuple, and List operations.
6. Python Program to Iterate Over Dictionaries Using for Loop
7. Python Program to Catch Multiple Exceptions in One Line
8. Python Program to Copy a File
9. Python Program to Get Line Count of a File
10. Python Program to Find All Files with .txt Extension Present Inside a Directory
11. Python Program to Return Multiple Values from a Function
12. Write a Python program to create a person class. Include attributes like name, country, and date of birth. Implement a method to determine the person's age
13. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.
14. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items and calculating the total price.
15. Create Python GUI using Tkinter
    a. Displaying Text and Images with Label Widgets
    b. Displaying Clickable Buttons with Button Widgets
    c. Getting User Input with Entry Widgets
    d. Getting Multiline User Input with Text Widgets
    e. Assigning Widgets to Frames with Frame Widgets
    f. Adjusting Frame Appearance with Relief

DESIGN AND ANALYSIS OF ALGORITHM
3150303

Skill Based Mini Projects

1. Sorting Algorithms Comparison: Implement and analyze the performance of different sorting algorithms, such as Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, etc., to determine their time and space complexities.
2. Search Algorithm Visualization: Develop a program to visualize and compare different search algorithms, such as Linear Search, Binary Search, Depth-First Search (DFS), Breadth-First Search (BFS), etc., on a graph or tree structure.
3. Knapsack Problem Solver: Create an algorithm that solves the Knapsack Problem using dynamic programming or a greedy approach. Test it with various input scenarios to analyze its efficiency and correctness.
4. Maze Solver: Design an algorithm to solve a maze by finding the shortest path from the start point to the exit point. Implement it using techniques like Depth-First Search (DFS), Breadth-First Search (BFS), or A* search algorithm.
5. Traveling Salesman Problem: Develop an algorithm to solve the Traveling Salesman Problem (TSP) using techniques like dynamic programming or branch and bound. Measure the algorithm's performance on different inputs and analyze its time complexity.
6. Graph Coloring: Create an algorithm to color a graph with the minimum number of colors such that no two adjacent vertices have the same color. Implement different strategies like Greedy Coloring, Backtracking, or Genetic Algorithms, and analyze their results.
7. Huffman Coding: Implement the Huffman coding algorithm for data compression. Analyze its effectiveness in terms of compression ratio and execution time for different input files.
8. Job Scheduling: Design an algorithm to schedule jobs on a single machine or multiple machines to minimize the total completion time or maximize resource utilization. Evaluate the algorithm's performance on various sets of jobs and resources.
9. Longest Common Subsequence: Develop an algorithm to find the longest common subsequence between two strings. Compare different approaches like brute force, dynamic programming, or memoization, and analyze their time and space complexities.
10. Minimum Spanning Tree: Implement algorithms like Prim's or Kruskal's algorithm to find the minimum spanning tree in a weighted graph. Test the algorithms on various graphs and compare their performance in terms of time and space complexity.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

Skill-Based Mini Project List

1. Blood Bank Management System
2. Railway Management System
3. Airlines Management System
4. Courier Service Management System
5. Attendance Management System
6. Inventory Management System
7. University Management System
8. Online Shopping Management System
9. Dispensary Management System
10. Taxi Management System
11. Retail Shop Management System
12. Stadium Seat Booking Management System
13. Metro Rail Management System
14. Hospital Management System
15. Library Management System
16. Payroll Management System
17. Cooking Recipe Management System
18. Billing System for a Departmental Store
19. Pharmacy Management System
20. Hotel Management System
21. Car Showroom Management System
22. Bike showroom management system
23. Online Crime Report management system
24. Gas Booking System
25. Farmer Bidding System

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)

Skill-Based Mini Project List

- Rock, paper, scissors game Python Project
- Password generator Python project
- QR code encoder and decoder python project
- Sudoku Solver game
- Create a Screen recorder using python.
- Make a Twitter Bot in Python
- Create an Auto login Bot
- Make Epidemic Help Bot
- Create a Product Availability checker for an online platform
- File Explorer in Python using Tkinter
- ToDo GUI Application using Tkinter
- Color game using Tkinter in Python
- Simple FLAMES game using Tkinter
- Simple registration form using Tkinte
- Sentiment Detector GUI using Tkinter

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN AND ANALYSIS OF ALGORITHM
3290303

List of Experiments

1. WAP to implement the following using array as data structure and analyze its time Complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Bucket sort f. Radix sort g. Heap sort h. Merge sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time Complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3290304 (DC) (New)
List of Experiments

1. Introduction to Structure Query Language (SQL)
   a) Overview of SQL
   b) Various Data Types in SQL
   c) Various Commands in SQL
   d) Various Constraints in SQL
2. Implementation of DDL commands of SQL with suitable examples
   a) Create table
   b) Alter table
   c) Drop table
3. Implementation of DML commands of SQL with suitable examples
   a) Insert
   b) Update
   c) Delete
4. Study and implementation of different types of constraints.
5. Implementation of different types of functions with suitable examples
   a) Number function
   b) Aggregate function
   c) Character function
   d) Conversion function
6. Implementation of different types of operators in SQL
   a) Arithmetic operators
   b) Logical operators
   c) Comparison operators
   d) Set operation
7. Implementation of different types of joins
   a) Inner join
   b) Outer join
   c) Natural join
8. Study and implementation of
   a) Group by and having clause
   b) Order by clause
   c) Indexing
9. Study and implementation of
   a) Sub-queries
   b) Views
10. Study and implementation of Database Backup and Recovery commands.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3290310(DLC)
List of Experiments

1. Python Program to
    a. Generate a Random Number
    b. Convert Kilometers to Miles
    c. Check if a Number is Positive, Negative or 0
    d. Print the Fibonacci sequence
    e. Find ASCII Value of Character
    f. Shuffle Deck of Cards
    g. Display Calendar
2. Python Program to
    a. Display the Fibonacci Sequence Using Recursion
    b. Find the Sum of Natural Numbers Using Recursion
    c. Find the Factorial of Number Using Recursion
    d. Convert Decimal to Binary Using Recursion
3. Python Program to Add Two Matrices, Transpose a Matrix, Multiply Two Matrices
4. Python Program to
    a. Check Whether a String is Palindrome or Not
    b. Remove Punctuations from a String
    c. Sort Words in Alphabetic Order
5. Python Program to Illustrate Different Set, Tuple, and List operations.
6. Python Program to Iterate Over Dictionaries Using for Loop
7. Python Program to Catch Multiple Exceptions in One Line
8. Python Program to Copy a File
9. Python Program to Get Line Count of a File
10. Python Program to Find All Files with .txt Extension Present Inside a Directory
11. Python Program to Return Multiple Values from a Function
12. Write a Python program to create a person class. Include attributes like name, country, and date of birth. Implement a method to determine the person's age
13. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.
14. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items and calculating the total price.
15. Create Python GUI using Tkinter
    a. Displaying Text and Images with Label Widgets
    b. Displaying Clickable Buttons with Button Widgets
    c. Getting User Input with Entry Widgets
    d. Getting Multiline User Input with Text Widgets
    e. Assigning Widgets to Frames with Frame Widgets
    f. Adjusting Frame Appearance with Relief

DESIGN AND ANALYSIS OF ALGORITHM
3290303

Skill Based Mini Projects List

1. Sorting Algorithms Comparison: Implement and analyze the performance of different sorting algorithms, such as Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, etc., to determine their time and space complexities.
2. Search Algorithm Visualization: Develop a program to visualize and compare different search algorithms, such as Linear Search, Binary Search, Depth-First Search (DFS), Breadth-First Search (BFS), etc., on a graph or tree structure.
3. Knapsack Problem Solver: Create an algorithm that solves the Knapsack Problem using dynamic programming or a greedy approach. Test it with various input scenarios to analyze its efficiency and correctness.
4. Maze Solver: Design an algorithm to solve a maze by finding the shortest path from the start point to the exit point. Implement it using techniques like Depth-First Search (DFS), Breadth-First Search (BFS), or A* search algorithm.
5. Traveling Salesman Problem: Develop an algorithm to solve the Traveling Salesman Problem (TSP) using techniques like dynamic programming or branch and bound. Measure the algorithm's performance on different inputs and analyze its time complexity.
6. Graph Coloring: Create an algorithm to color a graph with the minimum number of colors such that no two adjacent vertices have the same color. Implement different strategies like Greedy Coloring, Backtracking, or Genetic Algorithms, and analyze their results.
7. Huffman Coding: Implement the Huffman coding algorithm for data compression. Analyze its effectiveness in terms of compression ratio and execution time for different input files.
8. Job Scheduling: Design an algorithm to schedule jobs on a single machine or multiple machines to minimize the total completion time or maximize resource utilization. Evaluate the algorithm's performance on various sets of jobs and resources.
9. Longest Common Subsequence: Develop an algorithm to find the longest common subsequence between two strings. Compare different approaches like brute force, dynamic programming, or memoization, and analyze their time and space complexities.
10. Minimum Spanning Tree: Implement algorithms like Prim's or Kruskal's algorithm to find the minimum spanning tree in a weighted graph. Test the algorithms on various graphs and compare their performance in terms of time and space complexity.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
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   b) Order by clause
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   a) Sub-queries
   b) Views
10. Study and implementation of Database Backup and Recovery commands.

PROBLEM SOLVING USING PYTHON LAB

3290310(DLC)

Skill-Based Mini Project List

- Rock, paper, scissors game Python Project
- Password generator Python project
- QR code encoder and decoder python project
- Sudoku Solver game
- Create a Screen recorder using python.
- Make a Twitter Bot in Python
- Create an Auto login Bot
- Make Epidemic Help Bot
- Create a Product Availability checker for an online platform
- File Explorer in Python using Tkinter
- ToDo GUI Application using Tkinter
- Color game using Tkinter in Python
- Simple FLAMES game using Tkinter
- Simple registration form using Tkinte
- Sentiment Detector GUI using Tkinter

Scheme
for
M.Tech (Computer Science & Engineering)

ANNEXURE-18

Master of Technology (Computer Science & Engineering) (Semester-III) Recommended W.E.F JULY 2024

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
			Theory Slot			Practical Slot		MOOCs						
			End sem. Exam.	Mid sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation	Assign ment	Exam		L	T	P	
1.	620311	Dissertation Part-I *(Literature Review/ Problem Foundation/ Synopsis/survey paper, etc.)*	-	-	-	150	100	-	-	250	-	-	10	10
2.	OC	MOOC Course	-	-	-	-	-	25	75	100	02	-		02
		Total	-	-	-	**150**	**100**	**25**	**75**	**350**	**02**	-	**10**	**12**

Open Category course (OC-III) ***will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility).***

OC-III	
Subject Code	**Subject Name**
800306	Big Data Computing
800305	Computer Vision

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Department of Computer Science and Engineering

Annexure-19 and 20

CO Attainment and Feedback

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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(Declared Under Distinct Category by Ministry of Education, Government of India)
NAAC Accredited with A++ Grade
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CO attainment with Gap Analysis and action taken for July-Dec 2023

Sem	Faculty Name	Branch & Section	Course code & name		Course Outcome Statements	CO attainment from Quiz (%age)	CO attainment from assignment (%age)	CO attainment from Mid Term (%age)	CO attainment from End Term (%age)	CO direct attainment (%age)	CO direct attainment level	CO indirect attainment (%age)	CO indirect attainment level	Overall CO attainment	Target	Attained/Not attained	Action taken for Not Attained
I	Ms. Kratika	CSE	2150111-Digital	CO1	Explain the computer architecture for defining basic	80.00	80.39	73.35	80.65	79.71806457	3	82	3	3	2.5	Attained	
				CO2	Recall different number system and solve the basic	81.54	82.23	73.55	87.10	80.80645164	3	58	3	3	2.5	Attained	
				CO3	Develop the understanding of combinational circuits	74.19	71.98	87.10	92.90	84.61290323	3	79	3	3	2.5	Attained	
				CO4	Analyze the basic concept of sequential circuits	69.68	68.06	68.92	81.94	73.95161329	3	71	3	3	2.5	Attained	
				CO5	Compare various memories	67.10	65.16	75.48	76.77	72.79612258	3	78	3	3	2.5	Attained	
				CO6	Solve the boolean functions using logic gates	67.74	82.23	72.90	76.77	73.48387097	3	75	3	3	2.5	Attained	
I	Dr. Rohit	CSE	2150121-Computer	CO1	Identify situations where computational methods and	71.34	80.39	84.95	67.34	71.74176581	3	67.66	2.4	2.9	2.4	Attained	
				CO2	describe the basic principles of procedural programming	68.23	73.23	86.30	66.21	71.36231827	3	66.33	2.4	2.9	2.4	Attained	
				CO3	Develop algorithms and flowchart for a given problem	71.45	78.19	72.60	59.56	66.90303263	2.7	66.21	2.4	2.7	2.4	Attained	
				CO4	analyze the problems and choose suitable programming techniques to develop solutions	61.71	71.16	57.81	65.47	64.29596488	2.4	59.43	1.8	2.3	2.4	Not Attained	More assignment can be given related to this CO
				CO5	design, implement, debug and test programs	71.23	71.16	61.10	68.23	67.03198399	2.7	63.45	2.3	2.6	2.4	Attained	
				CO6	design computer programs to solve real world problems	77.69	76.98	62.90	57.57	63.86019867	2.4	65.34	2.3	2.4	2.4	Attained	
I	Dr. Smita gupta	CSE	2150115- Emerging	CO1	1. Illustrate concepts & applications of Artificial	58.90	61.97	78.71	77.99	74.5435	3	55.57	1.6	2.7	2.5	Attained	
				CO2	2. Describe the fundamental ideas behind Cloud	52.30	51.28	79.35	78.47	78.6225	3	52.99	1.3	2.7	2.5	Attained	
				CO3	3. Understand the basics of Cyber Security and working	53.85	54.09	83.23	74.94	71.3935	3	52.99	1.3	2.7	2.5	Attained	
				CO4	4. Analyze various Cyber Security Threats and	45.91	53.46	96.13	78.71	78.81875	3	54.82	1.5	2.7	2.5	Attained	
				CO5	5. Understand the internet of Things and its hardware	48.56	55.87	90.97	71.99	73.84375	3	52.14	1.3	2.6	2.5	Attained	
				CO6	6. Define the concept and challenges of Big Data, along	41.51	40.25	80.65	76.73	68.7475	2.9	47.86	1	2.5	2.5	Attained	
I	Dr. Jaimala Jha	CSD	2290121-Introduction	CO1	Analyze the problems and choose suitable programming techniques	66.52	66.66	68.11	77.08	63.39625	2.5	90	3	2.6	2.5	Attained	
				CO2	To Develop a pseudo-code and flowchart for a given problem	80.00	80.00	41.02	61.98	52.89601	2	85	3	3	2.5	Attained	
				CO3	To Design, implement, debug and test programs.	78.16	54.05	42.50	72.57	63.39601	2.5	83	3	2.4	2.5	Not Attained	More assignment ca be given related to this CO
				CO4	To Implement the basic principles of imperative and structured pr	83.91	66.62	40.00	83.79	61.7599	2.2	80	3	2.4	2.5	Not Attained	More assignment ca be given related to this CO
				CO5	To Design computer programs to solve real world problems.	82.78	40.00	40.23	73.66	60.449175	2.3	90	3	2.9	2.5	Attained	
				CO6													
I	Prof. Khushboo Agarwal	CSD	2290121-Computer Programming	CO1	identify situations where computational methods and computers would be useful	66.00	88.39	20.65	86.33	31.55	3	82	3	3	2.5	Attained	
				CO2	describe the basic principles of procedural programming	67.74	83.23	16.13	33.33	39.67546774	3	74	3	3	2.5	Attained	
				CO3	develop algorithms and flowchart for a given problem	63.32	68.74	20.65	31.81	38.4058871	3	79	3	3	2.5	Attained	
				CO4	analyze the problems and choose suitable programming	69.68	65.16	16.13	14.19	37.98333871	3	77	3	3	2.5	Attained	
				CO5	design, implement, debug and test programs.	67.10	63.16	20.65	7.10	35.08875806	3	78	3	3	2.5	Attained	
				CO6	design computer programs to solve real world problems	60.77	72.90	16.13	0.00	23.17290323	3	80	3	3.6	2.5	Not Attained	more questions can be added under this CO
III	Ms. Manisha	CSE	2150300-Operating	CO1	Outline the basic concept of operating systems	84	84	55	80.65	72.32258065	3	75	3	3	2.5	Attained	
				CO2	Analyze the working of operating system	60	72	72	78.58	74.09677419	3	75	3	3	2.5	Attained	
				CO3	Examine the working of various scheduling/allocation	72	64	66	87.84	64.46774194	2.4	69	2.8	2.5	2.5	Attained	
				CO4	Measure the performance of various	80	84	84	81.94	72.46774194	3	82	3	3	2.5	Attained	
				CO5	Analyze the various operating system problems/issues	84	72	59	60.65	71.32258065	3	85	3	3	2.5	Attained	
				CO6	Develop the Solution of various operating system	76	80	72	63.23	69.03290323	2.9	76	3	2.9	2.5	Attained	
III	Ms. Mansi	CSE	2150303-Design &	CO1	[illegible]	76	68	76	84	79	3	83	3	3	2.5	Attained	
				CO2	[illegible]	76	68	76	68	80.5	3	87	3	3	2.5	Attained	
				CO3	[illegible]	68	68	80	80	79	3	90	3	3	2.5	Attained	
				CO4	[illegible]	84	68	80	84	80	3	91	3	3	2.5	Attained	
				CO5	[illegible]	68	64	80	84	81	3	83	3	3	2.5	Attained	
				CO6	[illegible]	64	64	80	80	80.5	3	80	3	3	2.5	Attained	
III	Ms. Jigyasa Shukla	CSE	2150305-Software Engineering	CO1	Explain the various fundamental concepts of software engineering.	88	80	66	96.77	85.365	3	85	3	3	2.5	Attained	
				CO2	Develop the concepts related to software design & analysis	80	80	72	92.9	84.45	3	81	3	3	2.5	Attained	

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				CO3	Compare the techniques for software project management & estimation.	88	79	72	92.9	84.91	3	85	3	3	2.5	Attained	
				CO4	Choose the appropriate model for real life software project	88	84	72	90.97	84.985	3	84	3	3	2.5	Attained	
				CO5	Design the software using modern tools and technologies.	88	84	68	96.13	84.065	3	84	3	3	2.5	Attained	
				CO6	Test the software through different approaches.	88	80	52	88.03	78	3	84	3	3	2.5	Attained	
				CO6													
III	Ms. Mona	CSD	2190303-Design &	CO1	Tell the basic features of Algorithms.	76	68	84	96	87	3	83	3	3	2.5	Attained	
				CO2	Outline major Algorithms and Data Structures.	76	86	74	72	74.5	3	87	3	3	2.5	Attained	
				CO3	Apply various Algorithmic design paradigms.	68	88	90	76	80	3	81	3	3	2.5	Attained	
				CO4	Analyze the asymptotic performance of Algorithms.	88	72	80	88	80	3	81	3	3	2.5	Attained	
				CO5	Compare different design techniques to develop algorithms for computational problems.	88	80	88	76	81	3	83	3	3	2.5	Attained	
				CO6	Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.	88	88	84	56	80	3	80	3	3	2.5	Attained	
III	Dr. Jasmeet Jha	CSD	2190304-Database	CO1	Define the terminology, features, characteristics, and classification [illegible]	85.52	88.68	28.16892	80.51	70.69775	3	90	3	3	2.5	Attained	
				CO1	Identify different issues involved in the design and implementation of [illegible]	95.4	93.4	37.54651	84.25	77.8115515	3	87	3	3	2.5	Attained	
				CO3	Analyze database schema for a given problem domain.	87.38	71.36	51.72434	84.25	76.865535	3	87	3	3	2.5	Attained	
				CO4	Justify principles for logical design of database, including the E-R [illegible]	80.68	66.93	32.75862	96.55	75.287535	3	85	3	3	2.5	Attained	
				CO5	Apply normalization processing concepts and recovery methods over real [illegible]	80.8	66.67	37.18581	96.55	76.0847775	3	82	3	3	2.5	Attained	
				CO6	Formulate, using relational algebra and SQL, solutions to a broad [illegible]	86.88	68.97	32.18581	96.55	78.1497275	3	88	3	3	2.5	Attained	
III	Dr. Gagandeep Kaur	CSD	2190305-Software Engineering	CO1	Explain the various fundamental concepts of software engi[illegible]	94.05	96.43	77.83	92.66	89.9303749	3	86.46	3	3	2.5	Attained	
				CO2	Develop the concepts related to software design & analysis.	92.86	95.24	79.49	88.18	85.1824909	3	86.19	3	3	2.5	Attained	
				CO3	Compare the techniques for software project management [illegible]	92.86	92.86	75.77	91.67	87.4985313	3	90.42	3	3	2.5	Attained	
				CO4	Choose the appropriate model for real life software project	94.03	85.71	71.129	84.52	83.61129	3	84.58	3	3	2.5	Attained	
				CO5	Design the software using modern tools and technologies	90.83	89.29	81.84	94.05	90.4375	3	86.47	3	3	2.5	Attained	
				CO6	Test the software through different approaches.	91.67	92.86	81.94	84.81	85.81172	3	88.34	3	3	2.5	Attained	
I	Mr. Amit	CSE	150013-Information	CO1	Explain attacks, hash algorithms and authentication mech[illegible]	89	87.21	74.15	76.87	73.44125	3	67.47	1	2.6	2	Attained	
				CO2	Illustrate fundamentals of number theory and security	73	86.71	69.59	76.87	73.38159	3	67.87	1	2.6	2	Attained	
				CO3	Apply various algorithms to achieve principles of [illegible]	68	68.34	70.75	75.81	72.61825	3	67.87	1	2.6	2	Attained	
				CO4	Analyze the cause for various existing network attacks	86	52.38	49.05	52.38	64.8675	2.5	63.71	1	2.2	2	Attained	
				CO5	Examine the vulnerabilities in IT infrastructure.	65	46.84	78.07	48.3	55.41	1.5	63.71	1	1.4	2	Not Attained	questions can be added under the [illegible]
				CO6	Predicts the attacks and controls associated with IT.	73.33	8	0	32.38	35.62875	1	65.81	1	1	2	Not Attained	questions can be added under the [illegible]
I	Mr. Mahesh	CSE	150014-Compiler	CO1	Compare the similarities and differences among various [illegible]	58.86	84	88	85.3	81.7375	3	92	3	3	3	Attained	
				CO2	Apply the knowledge of lex tool & yacc tool to develop a [illegible]	65.71	78	80	91	78.61375	3	86	3	3	2.5	Attained	
				CO3	Implement various parsing, non-syntax optimization and [illegible]	52.38	76	88	73.23	73.6625	3	90	3	3	3	Attained	
				CO4	Develop program to solve complex problems in compiler	56.53	77	88	79.34	77.86125	3	89	3	3	2.5	Attained	
				CO5	Analyze the problems and limitations of modern compiler	62.5	85	83	80	78.9375	3	87	3	3	3	Attained	
I	Dr. Manish Dixit + Mr. Anshi	CSE	150515-Artificial Intelligence	CO1	Understand Concepts and applications of Artificial Intelligence and different types of intelligent systems	76.77	88.03	87.085	78.93	80.18775	3	78.58	3	3	3	Attained	
				CO2	Formulate problems as state space search problem and efficiently solve them	78.71	82.58	79.90	88.32	84.53625	3	73.47	3	3	3	Attained	
				CO3	Understand the working of various informed, uninformed and heuristic search algorithms.	75.35	80.63	78.93	80.95	80.465	3	72.81	3	3	3	Attained	
				CO4	Understand the concepts of knowledge representation techniques.	75.48	82.58	77.435	81.25	78.75625	3	73.54	3	3	3	Attained	
				CO5	Evaluate the various learning algorithms for solving problems.	81.85	80.87	79.985	82.58	77.09625	3	74.8	3	3	3	Attained	
				CO6													

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V	Ms. Khushboo Agarwal	CSD	2M0M3-Networking with TCP/IP	CO1	Define the basic functionality of TCP/IP layers	81.8	80.23	80.23	78.22	80.04625	3	87.5	3	3	3	Attained	
				CO2	analyze various addressing mechanism used in the internet	86.61	80.23	80.3	87.22	83.53375	3	88.13	3	3	3	Attained	
				CO3	elaborate the learning, Routing and Address translation	78.13	78.36	78.23	77.12	77.8075	3	86.25	3	3	3	Attained	
				CO4	analyze the working of Application layer protocols	81.2	80.23	78.88	88.21	84.56175	3	86.25	3	3	3	Attained	
				CO5	simulate network protocols & Topologies	45	78.41	83.23	88.22	83.81125	3	88.25	3	3	3	Attained	
				CO6	install, maintain and troubleshoot a TCP/IP Network	40	78.23	83.11	86.68	81.51375	3	73.23	3	3	3	Attained	
V	Dr. Gagandeep Kaur	CSD	2M0M3-Software Design & Project	CO1	I am able to Understand software design methodologies	87.68	85.45	77.22	78.98	80.818	3	93.24	3	3	3	Attained	
				CO2	I am able to Apply and recognize project management practices.	83.33	85.45	79.37	83.75	84.833	3	91.2	3	3	3	Attained	
				CO3	I am able to Understand user stories, tasks and Agile methodology.	91.23	80.3	79.83	85.75	85.53375	3	89.67	3	3	3	Attained	
				CO4	I am able to Understand and Apply Project Scheduling techniques.	84.83	80.2	86.89	71.84	78.39625	3	94.2	3	3	3	Attained	
				CO5	I am able to Recognize Quality Assurance and Control Techniques.	78.76	85.45	86.89	80.30	87.61375	3	88.47	3	3	3	Attained	
				CO6	I am able to Examine the Risks and Managing.	86.36	85.45	88.53	71.84	80.79625	3	91.54	3	3	3	Attained	
VII	Dr. Smita Parte	CSE	15IT16-Distributed	CO1	Tell the basic elements and concepts related to	66.1	71.83	81.52	87.08	87.32375	4.33	85.50	1.6	3.2	2	Attained	
				CO2	Demonstrate knowledge of the core architectural aspects	57.78	87.76	81.52	87.28	84.5075	3	85.50	1.6	3.2	2	Attained	
				CO3	Identify how the resources in a distributed system are	67.64	85.35	88.73	92.96	84.5075	3	85.50	1.6	3.2	2	Attained	
				CO4	Exercise the concept of distributed file system and	49.3	45.67	91.55	91.55	80.45875	3	61.11	2.1	3.8	3	Attained	
				CO5	Compare various distributed system algorithms for	45.67	45.67	88.13	87.32	77.11	3						
				CO6													

Attainment Levels	Excellent (3)	Very Good (2)	Good (1)
	70	60	50

Total CO Attainment = 80% of Direct CO
Direct CO Attainment = 12.5% of Weekly Quiz Score +

For Indirect CO attainment: CO feedback from the students, by respective course instructor, was collected (via Institute's MOODLE), along with the course mid semester and end semester paper setting.

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Feedback Analysis (Jan. - June 2024)

Student Curriculum Feedback - CSE 4th Semester

Course Name & Code: Computer Networks 2150411

No. of Responses: 64

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	7.81	4.69	26.56	23.44	37.5	75.63
The syllabus units are balanced	7.81	4.69	21.88	32.81	32.81	75.62
The learning material was available to you	6.25	10.94	21.88	26.56	34.38	74.38
The content was clear and easy to understand	7.81	4.69	26.56	25	35.94	75.31
The course was relevant and updated for present needs	7.81	4.69	23.44	31.25	32.81	75.31
The course meets your career expectations	7.81	6.25	25	28.13	32.81	74.38
The course will be useful to meet your higher studies/future aspirations.	9.38	3.13	21.88	26.56	39.06	76.56

Course Name & Code: Optimization Techniques 2150412

No. of Responses: 102

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	2.94	23.53	27.45	46.08	83.33
The syllabus units are balanced	0	1.96	26.47	26.47	45.1	82.94
The learning material was available to you	0	3.892	13.73	28.43	53.92	86.46
The content was clear and easy to understand	0	4.9	22.55	29.41	43.14	82.16
The course was relevant and updated for present needs	0	3.92	16.67	37.25	42.16	83.53
The course meets your career expectations	0.98	4.9	16.67	35.29	42.16	82.55

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The course will be useful to meet your higher studies/future aspirations.	0.98	3.92	19.61	34.31	41.18	82.16

Course Name & Code: Data Mining and Warehousing 2150413

No. of Responses: 33

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	3.03	27.27	18.18	51.52	83.64
The syllabus units are balanced	0	6.06	18.18	30.3	45.45	83.02
The learning material was available to you	0	3.03	21.21	30.3	45.45	83.63
The content was clear and easy to understand	0	0	27.27	27.27	45.45	83.63
The course was relevant and updated for present needs	0	0	21.21	30.3	48.48	85.45
The course meets your career expectations	0	3.03	21.21	30.3	45.45	83.63
The course will be useful to meet your higher studies/future aspirations.	3.03	3.03	18.18	24.24	51.52	83.64

Course Name & Code: Theory of Computation 2150414

No. of Responses: 100

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	1	6	13	32	48	84
The syllabus units are balanced	1	7	16	26	50	83.4
The learning material was available to you	3	4	17	28	48	82.8

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The content was clear and easy to understand	2	4	19	26	49	83.2
The course was relevant and updated for present needs	3	7	17	25	48	81.6
The course meets your career expectations	1	7	17	26	49	83
The course will be useful to meet your higher studies/future aspirations.	1	5	16	31	47	83.6

Course Name & Code: Artificial Intelligence 2150415

No. of Responses: 40

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	7.5	27.5	30	35	78.5
The syllabus units are balanced	0	12.5	22.5	30	35	77.5
The learning material was available to you	0	5	30	27.5	37.5	79.5
The content was clear and easy to understand	2.5	5	30	25	37.5	78
The course was relevant and updated for present needs	0	12.5	20	42.5	25	76
The course meets your career expectations	0	10	22.5	37.5	30	77.5
The course will be useful to meet your higher studies/future aspirations.	0	10	20	37.5	32.5	78.5

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Additional Suggestion by students and Action Taken Report

S. No.	Course name and code	Additional Comments by students							Action Taken
		Details of the course / contents which in the student's opinion are outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?	Suggestion for Honours:	Suggestion for Minor specialization :	Suggestion for Departmental electives:	Suggestion for Open electives:	
1	Computer Networks 2150411	No Comment	No Comment	No Comment	No Comment	No Comment	No Comment	No Comment	All the responses are Satisfactory
2	Optimization Techniques 2150412	simplex method	simplex method	Some practical applications of Optimization techniques will be helpful.	Nothing Good	Nothing Good Good	Good	Nothing	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.
3	Data Mining and Warehousing	good NIL	good NIL	good NIL	good	good	good	nil	All the responses are Satisfactory

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	2150413								
4	Theory of Computation 2150414	DFA & NFA	-	-	-	-	-	-	Syllabus will be discussed in the upcoming BOS meeting for the updates suggested by the students. The suggestive list of Honor, Minor and elective courses will be forwarded and presented in upcoming BOS for necessary actions.
5	Artificial Intelligence 2150415	no	Higher education needs to be a specialization of AI tools.	none	No, it's all enough.	no	good	good	Syllabus will be discussed in the upcoming BOS meeting for the updates suggested by the students. The suggestive list of Honor, Minor and elective courses will be forwarded and presented in upcoming BOS for necessary actions.

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Student Curriculum Feedback - CSD 4th Semester

Course Name & Code: Web Technologies 2290401
No. of Responses: 45

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	2.22	4.44	31.11	28.89	33.33	77.33
The syllabus units are balanced	2.22	4.44	26.67	31.11	35.56	78.67
The learning material was available to you	2.22	2.22	26.67	26.67	42.22	80.89
The content was clear and easy to understand	2.22	8.89	20	28.89	40	79.11
The course was relevant and updated for present needs	4.44	2.22	24.44	33.33	35.56	78.66
The course meets your career expectations	4.44	4.44	22.22	31.11	37.78	78.66
The course will be useful to meet your higher studies/future aspirations.	4.44	4.44	22.22	28.89	40	79.11

Course Name & Code: Microprocessor Design 2290402
No. of Responses: 24

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	8.33	33.33	29.17	29.17	75.84
The syllabus units are balanced	0	16.67	29.17	25	29.17	73.34
The learning material was available to you	12.5	16.67	20.83	29.17	20.83	65.83

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The content was clear and easy to understand	4.17	8.33	29.17	25	33.33	75
The course was relevant and updated for present needs	0	16.67	20.83	33.33	29.17	75
The course meets your career expectations	4.17	12.5	25	25	33.33	74.16
The course will be useful to meet your higher studies/future aspirations.	4.17	8.33	25	29.17	33.33	75.83

Course Name & Code : Optimization Techniques 2290403

No. of Responses: 45

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	2.22	11.11	26.67	20	40	76.89
The syllabus units are balanced	2.22	4.44	31.11	22.22	40	78.66
The learning material was available to you	2.22	4.44	26.67	22.22	44.44	80.44
The content was clear and easy to understand	2.22	4.44	37.78	15.56	40	77.34
The course was relevant and updated for present needs	4.44	2.22	33.33	22.22	37.78	77.33
The course meets your career expectations	4.44	4.44	28.89	24.44	37.78	77.33
The course will be useful to meet your higher studies/future aspirations.	4.44	2.22	31.11	22.22	40	78.22

Course Name & Code : Theory of Computation 2290404

No. of Responses: 32

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)

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The course is well designed	3.13	15.63	9.38	25	46.88	79.39
The syllabus units are balanced	3.13	18.75	18.75	15.63	43.75	75.63
The learning material was available to you	6.25	21.88	9.38	18.75	43.75	74.38
The content was clear and easy to understand	3.13	15.63	18.75	21.88	40.63	76.26
The course was relevant and updated for present needs	3.13	15.63	15.63	21.88	43.75	77.51
The course meets your career expectations	0	15.63	15.63	25	43.75	79.38
The course will be useful to meet your higher studies/future aspirations.	0	15.63	12.5	31.25	40.63	79.38

Course Name & Code: Computer Networks 2290405

No. of Responses: 43

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	6.98	25.58	20.93	46.51	81.39
The syllabus units are balanced	0	4.65	27.91	25.58	41.86	80.93
The learning material was available to you	0	4.65	16.28	32.56	46.51	84.19
The content was clear and easy to understand	0	4.65	18.6	34.88	41.86	82.78
The course was relevant and updated for present needs	0	4.65	30.23	23.26	41.86	80.47
The course meets your career expectations	0	4.65	25.58	27.91	41.86	81.4
The course will be useful to meet your higher studies/future aspirations.	0	6.98	23.26	25.58	44.19	81.4

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Additional Suggestion by students and Action Taken Report

S. No.	Course name and code	Additional Comments by students							Action Taken
		Details of the course / contents which in the student's opinion are outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?	Suggestion for Honours:	Suggestion for Minor specialization:	Suggestion for Departmental electives:	Suggestion for Open electives:	
1	Web Technologies 2290401	Php	Php	Mongodb NAA javascript in more details		Ui/ux	Frontend developer	Cyber security	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.
2	Microprocessor Design 2290402	8085 microprocessor, MICROPROCESSOR DESIGN	Nothing	APTITUDE	Robotics	Machine learning	Skills NO NA	File handling	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be

									forwarded and presented in upcoming BoS for necessary actions.
3	Optimization Techniques 2290403	Nothing to remove	Genetic algorithm	na	NA	NA	NA	NA	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.
4	Theory of Computation 2290404	none	industrial knowledge	none	cyber security	cyber security	cyber security	cyber security	Syllabus will be discussed in the upcoming BOS meeting for the updates suggested by the students. The suggestive list of Honor, Minor and elective courses will be forwarded and

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									presented in upcoming BOS for necessary actions.
5	Computer Networks 2290405	No	Cyber security	Cyber security cyber security	Cyber security	Cyber security	Cyber security	Cyber security	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.

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Feedback Analysis (Jan. - June 2024)

Student Curriculum Feedback - CSE 6th Semester

Course Name & Code: Data Structures OC-1 - 910100

No. of Responses: 11

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	9.09	36.36	18.18	36.36	76.36
The syllabus units are balanced	0	9.09	36.36	18.18	36.36	76.36
The learning material was available to you	0	9.09	27.27	9.09	54.54	81.81
The content was clear and easy to understand	0	9.09	27.27	18.18	45.45	79.99
The course was relevant and updated for present needs	0	9.09	27.27	18.18	45.45	79.99
The course meets your career expectations	0	9.09	27.27	18.18	45.45	79.99
The course will be useful to meet your higher studies/future aspirations.	0	9.09	27.27	18.18	45.45	79.99

Course Name & Code: Python Programming OC-1 - 910101

No. of Responses: 11

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	0	18.18	36.36	45.45	85.45
The syllabus units are balanced	0	0	36.36	18.18	45.45	81.81
The learning material was available to you	0	0	18.18	27.27	54.55	87.27

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The content was clear and easy to understand	0	0	27.27	27.27	45.45	83.63
The course was relevant and updated for present needs	0	0	36.36	18.18	45.45	81.81
The course meets your career expectations	0	0	18.18	36.36	45.45	85.45
The course will be useful to meet your higher studies/future aspirations.	0	0	27.27	27.27	45.45	83.63

Course Name & Code : Cloud Computing and Virtualization 150615

No. of Responses: 41

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	4.88	7.32	36.59	51.22	86.84
The syllabus units are balanced	0	7.32	14.63	26.83	51.22	84.39
The learning material was available to you	0	4.88	12.2	31.71	51.22	85.86
The content was clear and easy to understand	0	7.32	12.2	21.95	58.54	86.35
The course was relevant and updated for present needs	0	7.32	9.76	31.71	51.22	85.37
The course meets your career expectations	0	7.32	12.2	29.27	51.22	84.88
The course will be useful to meet your higher studies/future aspirations.	0	4.88	14.63	34.15	46.34	84.39

Course Name & Code : Digital Image Processing 150616

No. of Responses: 56

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	5.36	5.36	19.64	19.64	50	80.71

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The syllabus units are balanced	7.14	5.36	14.29	26.79	46.43	80.01
The learning material was available to you	10.71	0	17.86	23.21	48.21	79.64
The content was clear and easy to understand	7.14	5.36	16.07	21.43	50	80.36
The course was relevant and updated for present needs	7.14	5.57	17.86	17.86	53.57	82.23
The course meets your career expectations	5.36	3.57	23.21	23.21	44.64	79.63
The course will be useful to meet your higher studies/future aspirations.	7.14	1.79	19.64	25	46.43	80.36

Course Name & Code: Machine Learning 150617
No. of Responses: 26

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	4.86	7.29	14.89	26.44	46.5	80.47
The syllabus units are balanced	5.33	7.67	15.23	26.59	44.5	79.04
The learning material was available to you	7.67	6.56	24.27	31.59	29.63	73.62
The content was clear and easy to understand	5.33	7.67	17.64	21.59	47.5	79.49
The course was relevant and updated for present needs	41.5	24.44	24.89	4.29	4.86	41.3
The course meets your career expectations	4.23	4.29	19.43	37.47	34.52	78.72
The course will be useful to meet your higher studies/future aspirations.	7.23	8.1	15.07	26.89	42.52	77.76

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Feedback Analysis (Jan. - June 2024)

Course Name & Code: Intellectual Property Rights(Mandatory Audit Course

No. of Responses: 31

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	6.45	0	12.9	25.81	54.84	84.52
The syllabus units are balanced	6.45	3.23	6.45	32.26	51.61	83.87
The learning material was available to you	6.45	0	12.9	32.26	48.39	83.23
The content was clear and easy to understand	6.45	0	6.45	35.48	51.61	85.15
The course was relevant and updated for present needs	6.45	0	9.68	29.03	54.84	85.16
The course meets your career expectations	6.45	0	9.68	35.48	48.39	83.87
The course will be useful to meet your higher studies/future aspirations.	6.45	3.23	12.9	32.26	45.16	81.29

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Feedback Analysis (Jan. - June 2024)

Additional Suggestion by students and Action Taken Report

S. No.	Course name and code	Additional Comments by students							Action Taken
		Details of the course / contents which in the student's opinion are outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?	Suggestion for Honours:	Suggestion for Minor specialization:	Suggestion for Departmental electives:	Suggestion for Open electives:	
1	Data Structures OC-1 - 910100)	NA	NA	NA	NA	NA	NA	NA	All the responses are Satisfactory.
2	Python Programming OC-1 - 910101)	it was basic easy for dept students as well therefore good	nil	nil	nil	nil	nil	nil	All the responses are Satisfactory.
3	Cloud Computing and Virtualization 150615	No need to remove	according to current scenario	Development course are included (Andorid develop,Web)	no comments	no comments	placement preparations related courses	Web & App development related course	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective

									courses will be forwarded and presented in upcoming BoS for necessary actions.
4	Digital Image Processing 150616	Good	Color Image Processing	No	Good NA	NA Good	NA Good	NA Good	Syllabus will be discussed in the upcoming BOS meeting for the updates suggested by the students. The suggestive list of Honor, Minor and elective courses will be forwarded and presented in upcoming BOS for necessary actions.
5	Machine Learning 150617	nil	nil	nil	nil	nil	nil	nil	All the responses are Satisfactory
6	Intellectual Property Rights(Mandatory Audit Course)	NA	NA	NA	NA	NA	NA	NA	All the responses are Satisfactory

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Feedback Analysis (Jan. - June 2024)

Student Curriculum Feedback - CSD 6th Semester

Course Name & Code: IOT System Design 290601

No. of Responses: 24

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	8.33	33.33	29.17	29.17	75.84
The syllabus units are balanced	0	16.67	29.17	25	29.17	73.34
The learning material was available to you	12.5	16.67	20.83	29.17	20.83	65.83
The content was clear and easy to understand	4.17	8.33	29.17	25	33.33	75
The course was relevant and updated for present needs	0	16.67	20.83	33.33	29.17	75
The course meets your career expectations	4.17	12.5	25	25	33.33	74.16
The course will be useful to meet your higher studies/future aspirations.	4.17	8.33	25	29.17	33.33	75.83

Course Name & Code: Soft Computing 290602

No. of Responses: 34

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	11.76	23.53	29.41	35.29	77.64
The syllabus units are balanced	2.94	11.76	26.47	29.41	29.41	74.11
The learning material was available to you	0	8.82	23.53	35.29	32.25	78.13
The content was clear and easy to understand	0	8.82	32.35	23.53	35.29	77.05
The course was relevant and updated for present needs	0	8.82	29.41	29.41	32.35	77.05
The course meets your career expectations	0	11.76	26.47	29.41	32.35	76.46
The course will be useful to meet your higher studies/future aspirations.	0	8.82	26.47	29.41	35.29	78.23

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Madhav Institute of Technology & Science, Gwalior

(Deemed to be University)

Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Artificial Intelligence and Machine Learning 290603

No. of Responses: 13

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	0	7.6	15.38	30.76	46.16	83.04
The syllabus units are balanced	0	7.6	23.07	23.07	46.15	81.49
The learning material was available to you	0	7.6	15.38	30.76	46.15	83.03
The content was clear and easy to understand	0	7.6	23.07	23.07	46.15	81.49
The course was relevant and updated for present needs	0	7.6	23.07	15.38	53.84	83.03
The course meets your career expectations	0	7.6	23.07	23.07	46.15	81.49
The course will be useful to meet your higher studies/future aspirations.	0	7.6	30.76	15.38	46.15	79.95

Course Name & Code :Intellectual Property Rights(Mandatory Audit Course

No. of Responses: 29

Parameters	Below Average (%age Response)	Average (%age Response)	Good (%age Response)	Very Good (%age Response)	Excellent (%age Response)	Overall Score (%)
The course is well designed	3.45	3.45	17.24	17.24	58.62	84.83
The syllabus units are balanced	3.45	3.45	20.69	17.24	55.17	83.45
The learning material was available to you	3.45	3.45	13.79	20.69	58.62	85.52
The content was clear and easy to understand	3.45	3.45	10.34	31.03	51.72	84.82
The course was relevant and updated for present needs	3.45	3.45	10.34	31.03	51.72	84.82
The course meets your career expectations	3.45	3.45	13.79	24.14	55.17	84.83
The course will be useful to meet your higher studies/future aspirations.	3.45	6.9	10.34	27.59	51.72	83.45

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Additional Suggestion by students and Action Taken Report

S. No.	Course name and code	Additional Comments by students							Action Taken
		Details of the course / contents which in the student's opinion are outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?	Suggestion for Honours:	Suggestion for Minor specialization:	Suggestion for Departmental electives:	Suggestion for Open electives:	
1	IOT System Design 290601	complete course should be removed, not much usable in computer science	nothing	Distributed Computing, Cloud Computing, Web Security,	Iot application none	Iot application none	Iot application Embedded sensing actuation and interfacing systems none	ot application none	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.
2	Soft Computing 290602	nil	nil	nil	nil	nil	nil	nil	All the responses are Satisfactory.
3	Artificial	none	none	nothing	none	none	none	Embedded	

	Intelligence and Machine Learning 290603							sensing actuation & interfacing system	Syllabus will be discussed in the upcoming BoS meeting for the updates suggested by the students. The suggestive list of Honour, Minor and elective courses will be forwarded and presented in upcoming BoS for necessary actions.
4	Intellectual Property Rights(Mandatory Audit Course)	NA	NA	NA	NA	NA	NA	NA	All the responses are Satisfactory.

Madhav Institute of Technology & Science, Gwalior

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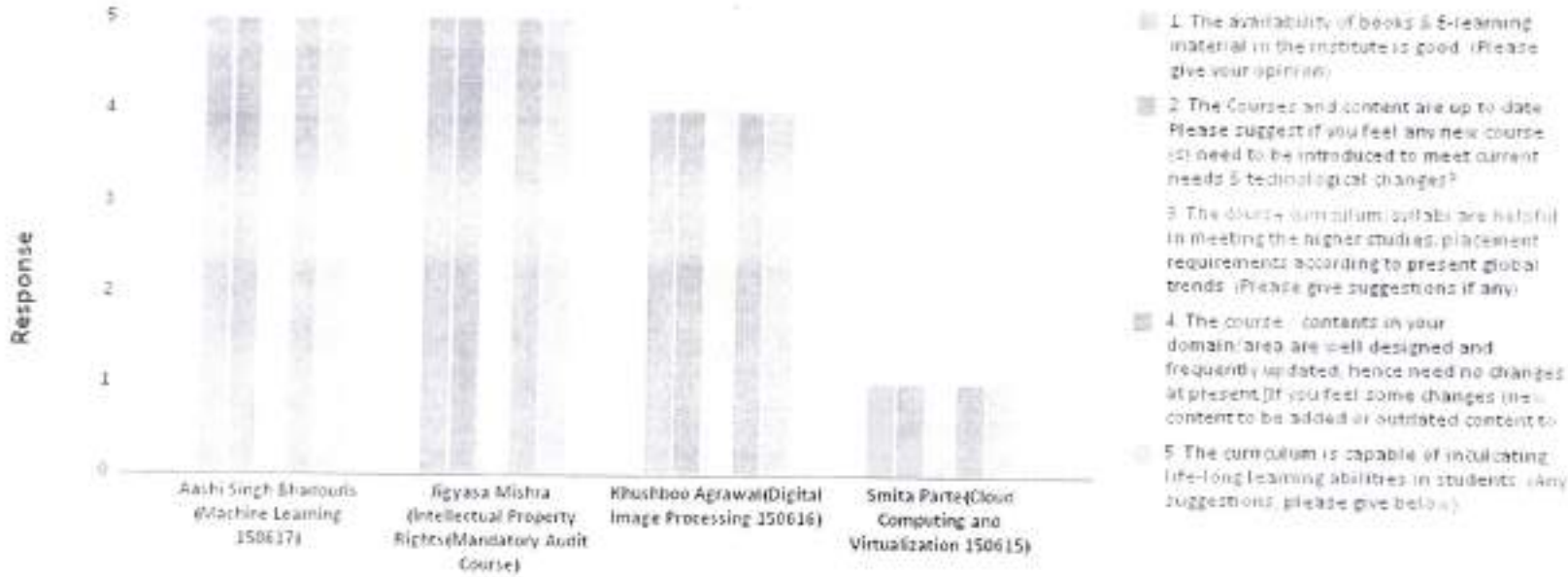
Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Faculty Course Curriculum Feedback for CSE Six Semester (Jan-June. 2024)



Response Mapping: *1 - Strongly Disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly Agree*

Madhav Institute of Technology & Science, Gwalior

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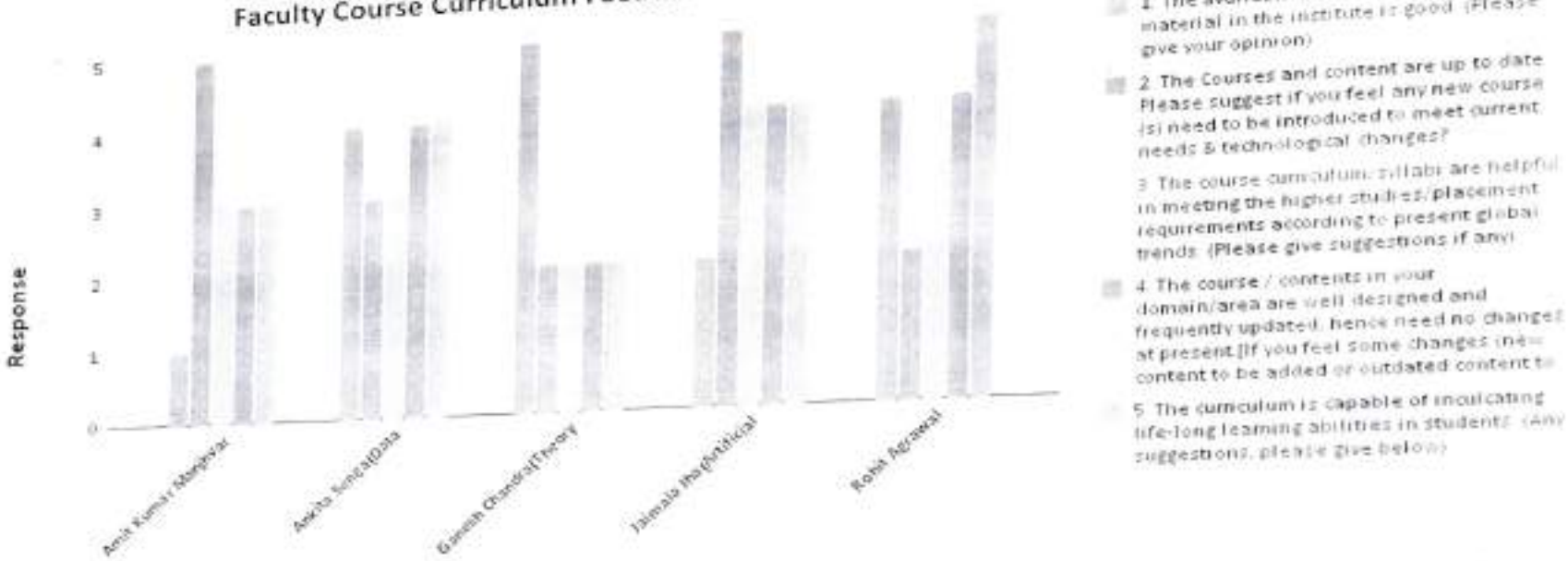
Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Faculty Course Curriculum Feedback for CSE Fourth Semester (Jan-June. 2024)



Response Mapping: *1 - Strongly Disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly Agree*

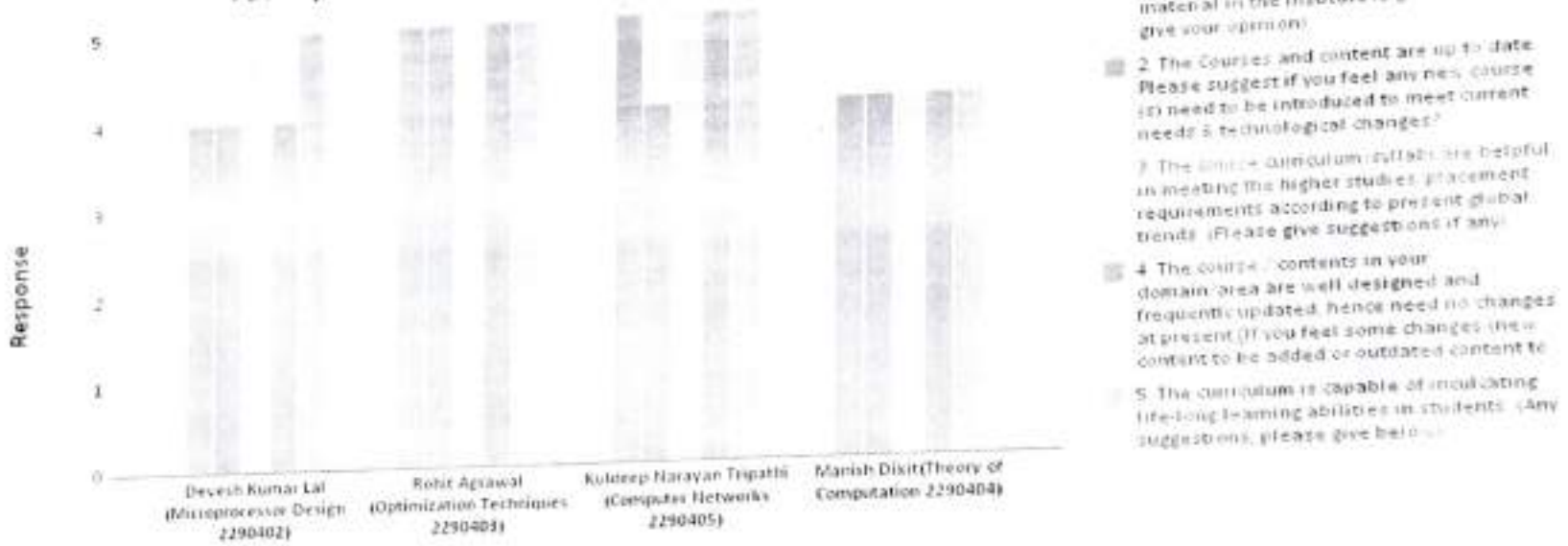
Madhav Institute of Technology & Science, Gwalior

(Deemed to be University)

Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Faculty Course Curriculum Feedback for CSD Fourth Semester (Jan-June. 2024)



Response Mapping: *1 - Strongly Disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly Agree*

Madhav Institute of Technology & Science, Gwalior

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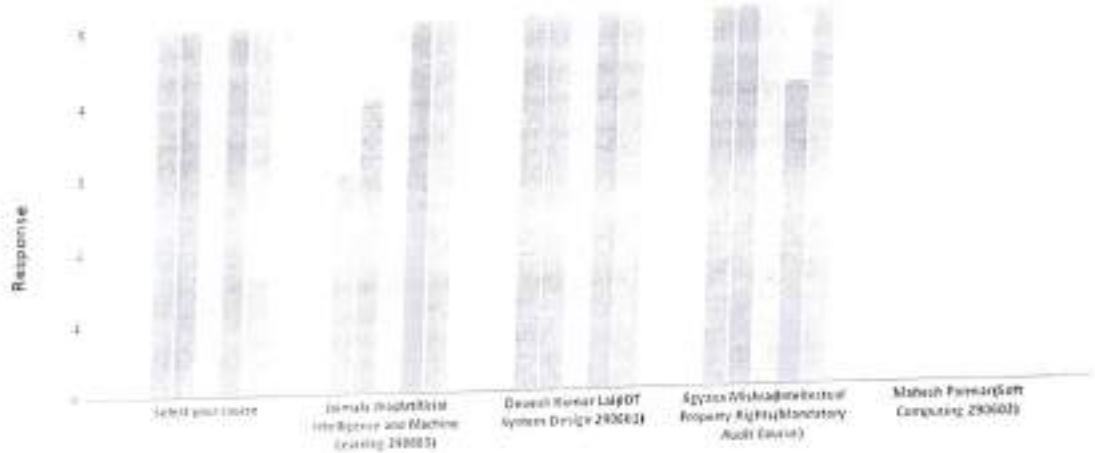
Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Faculty Course Curriculum Feedback for CSD Six Semester (Jan-June. 2024)



1. The availability of course e-learning material in the institute is good. (Please give your opinion)
2. The courses and content are up to date. Please suggest if you feel any new courses need to be introduced to meet current needs & technological changes?
3. The course curriculum syllabi are helpful in meeting the higher studies, placement requirements according to student global trends. (Please give suggestions if any)
4. The course contents in your curriculum are well designed and the syllabi is updated. Have needed changes been present? (If you feel some changes, new contents be added or outdated contents be removed, be needed, please suggest)
5. The curriculum is capable of monitoring/detecting learning abilities of students. (Any suggestions, please give below)

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Action Taken Report for Faculty Curriculum Feedback

S. No.	Course Instructor with course name and code	Action Taken
1	Amit Kumar Manjhvar(Computer Networks 2150411)	All the responses are Satisfactory.
2	Ankita Senga(Data Mining and Warehousing 2150413)	All the responses are Satisfactory.
3	Ganesh Chandra(Theory of Computation 2150414)	All the responses are Satisfactory.
4	Jaimala Jha(Artificial Intelligence 2150415)	All the responses are Satisfactory.
5	Rohit Agrawal(Optimization Techniques 2150412)	All the responses are Satisfactory.
6	Devesh Kumar Lal(Microprocessor Design 2290402)	All the responses are Satisfactory.
7	Rohit Agrawal(Optimization Techniques 2290403)	All the responses are Satisfactory.
8	Kuldeep Narayan Tripathi(Computer Networks 2290405)	All the responses are Satisfactory.
9	Manish Dixit(Theory of Computation 2290404)	All the responses are Satisfactory.
10	Aashi Singh Bhadouria(Machine Learning 150617)	All the responses are Satisfactory.
11	Jigyasa Mishra(Intellectual Property Rights(Mandatory Audit Course)	All the responses are Satisfactory.
12	Khushboo Agrawal(Digital Image Processing 150616)	All the responses are Satisfactory.
13	Smita Parte(Cloud Computing and Virtualization 150615)	All the responses are Satisfactory.
14	Jaimala Jha(Artificial Intelligence and Machine Learning 290603)	All the responses are Satisfactory.
15	Devesh Kumar Lal(IOT System Design 290601)	All the responses are Satisfactory.
16	Jigyasa Mishra(Intellectual Property Rights(Mandatory Audit Course)	All the responses are Satisfactory.
17	Mahesh Parmar(Soft Computing 290602)	All the responses are Satisfactory.

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Student CO Feedback - CSE 4th Semester

Course Name & Code: Computer Networks 2150411

No. of Responses: 67

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Outline the Data Communications System and its components.	46.27	37.31	16.42	76.62
I am able to Identify the different types of network topologies and protocols.	50.75	37.31	11.94	79.6
I am able to Enumerate the layers of the OSI model and function(s) of each layer.	47.76	38.81	13.43	78.11
I am able to Analyze the problems associated with various networking protocols and measure the Performance	43.28	41.79	14.93	76.12
I am able to Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation	38.81	46.27	14.93	74.63

Course Name & Code: Optimization Techniques 2150412

No. of Responses: 101

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Describe fundamental concepts of optimization, including its role in engineering applications.	46.53	48.51	4.95	80.52
I am able to Describe a clear understanding of the importance of formulating optimization problems.	51.49	44.55	3.96	82.51
I am able to Apply their knowledge by classifying optimization problems, formulating linear programming problems.	47.52	44.52	7.92	79.84
I am able to Analyze optimization algorithms such as gradient descent, steepest descent, Newton's method, and direct methods for constrained optimization.	50.5	40.59	8.91	80.53
I am able to Evaluate optimization methods, comparing their efficiency, limitations, and practical applications.	49.5	42.57	7.92	80.52

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Data Mining and Warehousing 2150413

No. of Responses: 58

Parameters(COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Classify various databases systems and data models of data warehouse	52.63	49.12	0	85.38
I am able to Compare various methods for storing & retrieving data from different data sources/repository	47.36	52.63	0.017	82.45
I am able to Apply pre-processing techniques for construction of data warehouse	52.63	47.36	1.75	84.79
I am able to Analyze data mining for knowledge discovery & prediction	52.63	45.61	3.5	84.2
I am able to Explain data mining methods for identification of association for transactional databases	52.63	47.36	1.75	84.79
I am able to Develop various classification and clustering algorithms for data using data mining	45.61	50.87	5.26	81.28

Course Name & Code: Theory of Computation 2150414

No. of Responses: 90

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to . describe the basic concepts of switching and finite automata theory & languages.	52.22	42.22	5.56	82.22
I am able to compute abstract models of computing and check their power to recognize the languages	50	44.44	5.56	81.48
I am able to analyse the grammar, its types, simplification and normal form	51.11	44.44	4.44	82.22
I am able to design mathematical models to prove properties of languages, grammars and automata	53.33	42.22	4.44	82.96
I am able to apply automata theory, languages and computation in engineering application	46.67	46.67	6.67	80.01

I am able to apply automata theory, languages and computation in engineering application	51.11	41.11	7.78	81.11

Course Name & Code: Artificial Intelligence 2150415
No. of Responses: 29

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Understand concepts & applications of Artificial Intelligence and different types of intelligent agents.	48.27	37.93	13.79	78.15
I am able to Formulate problems as state space search problems & efficiently solve them.	48.27	34.48	17.24	77
I am able to Understand the working of various informed, uninformed and heuristics searching algorithms.	48.27	41.37	10.34	79.3
I am able to Understand the concept of knowledge representation techniques	48.27	34.48	17.24	77
I am able to Evaluate the various learning algorithms for solving problems.	44.82	34.48	20.68	74.7

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Madhav Institute of Technology & Science, Gwalior
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Department of Computer Science and Engineering
Feedback Analysis (Jan. - June 2024)

Student CO Feedback - CSD 4th Semester

Course Name & Code: Web Technologies 2290401
No. of Responses: 42

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Distinguish among various web designing technologies for website development	45.24	45.24	9.52	78.57
I am able to Construct web pages using HTML and CSS	54.76	38.1	7.14	82.54
I am able to Model website using JavaScript and PHP	42.86	42.86	14.29	76.2
I am able to Design Static and Dynamic website	50	47.62	2.38	82.54
I am able to Explain the working of web pages and data retrieval	47.62	50	2.38	81.75

Course Name & Code: Microprocessor Design 2290402
No. of Responses: 23

Parameters(COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to apply suitable assembly code for different problems	43.48	56.52	0	81.16
I am able to apply and Understand Assembly Language Instructions	47.83	47.83	4.35	81.17
I am able to analyse the metrics for measuring microprocessor performance.	47.83	47.83	4.35	81.17
I am able to compare and classify the instruction set of 8085/8086 microprocessor	52.17	47.83	0	84.06
I am able to evaluate the architecture and organization of 8085/8086 microprocessor	52.17	47.83	0	84.06

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Optimization Techniques 2290403

No. of Responses: 44

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Describe fundamental concepts of optimization, including its role in engineering applications.	45.45	45.45	9.09	78.78
I am able to Describe a clear understanding of the importance of formulating optimization problems.	50	43.18	6.82	81.06
I am able to Apply their knowledge by classifying optimization problems, formulating linear programming problems.	45.45	47.73	3.82	78.54
I am able to Analyze optimization algorithms such as gradient descent, steepest descent, Newton's method, and direct methods for constrained optimization.	45.45	50	4.55	80.3
I am able to Evaluate optimization methods, comparing their efficiency, limitations, and practical applications.	43.18	45.45	11.36	77.27

Course Name & Code: Theory of Computation 2290404

No. of Responses: 35

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Describe the basic concepts of switching and finite automata theory & languages.	57.14	37.14	5.71	83.8
I am able to Compute abstract models of computing and check their power to recognize the languages.	57.14	31.43	11.43	81.9
I am able to analyze the grammar, its types, simplification and normal form.	51.43	42.86	5.71	81.91
I am able to Design mathematical models to prove properties of languages, grammars and automata.	51.43	40	8.57	80.95

I am able to Apply automata theory, languages and computation in engineering applications.	45.71	48.57	5.71	79.99

Course Name & Code : Computer Networks 2290405
No. of Responses: 42

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Explain the Basic networking concepts and components of data communication system	50	45.24	4.76	81.75
I am able to Describe the different types of network topologies, protocols, networks devices, transmission media	54.76	45.24	0	84.92
I am able to Apply channel allocation, framing, Error and flow control techniques.	47.62	52.38	0	82.54
I am able to Describe the functions of Network Layer and Transport Layer functions i.e. Routing Mechanism, Port addressing, Connection Management, Congestion control mechanism.	40.48	57.14	2.38	79.37
I am able to Explain the functions offered by session, presentation, and application layer and their Implementation.	42.86	54.76	2.38	80.16
I am able to Summarize the basic protocols of computer networks, and how they can be used to assist in network design and implementation	47.62	50	2.38	81.75

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Student CO Feedback - CSE 6th Semester

Course Name & Code: Data Structures (OC-1 - 910100)

No. of Responses: 10

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
Outline the basics of algorithms and their performance criteria	30	70	0	76.67
Explain the working of linear/non-linear data structures	30	70	0	76.67
Identify the appropriate data structure to solve specific problems	40	60	0	80
Analyze the performance of various data structures & their applications	30	60	10	73.33
Evaluate the time/space complexities of various data structures & their applications	40	50	10	76.67
Design the optimal algorithmic solutions for various problems	40	60	0	80

Course Name & Code: Python Programming (OC-1 - 910101)

No. of Responses: 13

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to understand basic python programming constructs	46.15	38.46	15.38	76.92
I am able to analyze various data structures available in python	38.46	46.15	15.38	74.35
I am able to implement the Object-oriented programming paradigm in Python	38.46	30.77	30.77	69.23
I am able to apply the different File handling operations	38.46	23.08	38.46	66.67
I am able to design GUI Application	30.77	30.77	38.46	64.1

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Cloud Computing and Virtualization (150615)

No. of Responses: 38

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
Define the fundamental ideas behind Cloud Computing	55.28	31.58	13.16	80.72
Discuss ideas and principles of Virtualization and its applications	60.53	26.32	13.16	82.46
Illustrate fundamental concepts of cloud infrastructures and Service Oriented Architecture	50	39.47	10.53	79.82
Analyze the fundamental concepts of cloud storage and cloud security	55.26	23.68	21.05	78.06
Summarize various tools and technologies for implementing applications of Cloud.	52.63	34.21	13.16	79.82
Assess technologies and real time applications based on Cloud Computing	57.89	23.68	18.42	79.82

Course Name & Code: Digital Image Processing (150616)

No. of Responses: 58

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to explain different modalities and current techniques in image acquisition	48.28	39.66	12.07	78.74
I am able to classify spatial and frequency domain techniques used in image processing	51.72	36.21	12.07	79.88
I am able to apply image processing techniques to enhance visual images	53.45	34.48	12.07	80.46
I am able to analyze the constraints in image processing when dealing with real problems.	53.45	32.76	13.79	79.89
I am able to evaluate various enhancement, restoration and retrieval techniques of image processing	46.55	37.93	15.52	77.01
I am able to design a system using the mathematical models and principles of digital image processing for real world problems.	51.72	36.21	12.07	79.88

Seen

Madhav Institute of Technology & Science, Gwalior

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Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Machine Learning (150617)

No. of Responses: 17

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
Define basic concepts of Machine Learning.	64.71	29.41	5.88	86.28
Illustrate various techniques for learner evaluation and optimization using python	64.71	23.53	11.76	84.32
Implement various types of supervised machine learning algorithm using python	64.71	29.41	5.88	86.28
Apply ML ensemble model to solve real world problem using python	70.59	17.65	11.76	86.28
Apply unsupervised ML techniques to solve real world problems using python	64.71	29.41	5.88	86.28

Course Name & Code Intellectual Property Rights(Mandatory Audit Course):

No. of Responses: 29

Parameters(COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Imbibe the knowledge of Intellectual Property and its protection through various laws	44.83	41.38	13.79	77.01
I am able to apply the knowledge of IPR for professional development.	55.17	34.48	10.34	81.6
I am able to develop a platform for protection and compliance of Intellectual Property Rights & knowledge	55.62	24.14	17.24	77.46
I am able to create awareness amidst academia and industry of IPR and Copyright compliance	41.38	44.83	13.79	75.86
I am able to deliver the purpose and function of IPR and patenting.	55.17	31.03	13.79	80.45

Seen

Madhav Institute of Technology & Science, Gwalior

(Deemed to be University)

Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Student CO Feedback - CSD 6th Semester

Course Name & Code: System Design 290601

No. of Responses: 24

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to define the basic concepts, principles, and challenges in IoT	33.33	58.33	8.33	77.01
I am able to describe the functioning of hardware devices and sensors used for IoT	41.67	50	8.33	81.6
I am able to apply network communication aspects and protocols used in IoT	29.17	62.5	8.33	77.46
I am able to analyze IoT for developing real-life applications using Arduino programming	33.33	50	16.67	75.86
I am able to develop different challenges during IoT system design.	37.5	54.17	8.33	80.45
I am able to evaluate IoT infrastructure for popular applications	33.33	58.33	8.33	77.01

Course Name & Code: Soft Computing 290602

No. of Responses: 34

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
Describe soft computing techniques and the basic models of Artificial Neural Network	50	44.44	5.56	81.48
Illustrate the operations, model and applications of fuzzy logic	52.78	41.67	5.56	82.41
Evaluate and develop the concepts of Genetic Algorithm	50	38.89	11.11	79.63
Analyze the concepts of multi-objective optimization models and the need for using hybrid soft computing approaches	55.56	36.11	8.33	82.41
Design a system using the mathematical models and principles of soft computing for real world problems	47.22	38.89	13.99	77.81

Madhav Institute of Technology & Science, Gwalior

(Deemed to be University)

Department of Computer Science and Engineering

Feedback Analysis (Jan. - June 2024)

Course Name & Code: Artificial Intelligence and Machine Learning (290603)

No. of Responses: 14

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Define basic concepts of Artificial Intelligence & Machine Learning	42.85	42.85	14.28	76.18
I am able to : Illustrate various techniques for knowledge representation and processing.	42.85	42.85	14.28	76.18
I am able to Apply various model optimization and tuning approaches.	50	35.71	14.28	78.57
I am able to Develop a model using supervised/unsupervised machine learning algorithms for classification/prediction/clustering	57.14	35.71	7	83.28
I am able to Evaluate performance of machine learning algorithms on various data sets of a domain.	64.28	28.57	7.14	85.71

Course Name & Code:Intellectual Property Rights(Mandatory Audit Course)

No. of Responses: 29

Parameters (COs)	Strongly Agree (%age Response)	Agree (%age Response)	Average (%age Response)	Overall Score (%)
I am able to Imbibe the knowledge of Intellectual Property and its protection through various laws	44.83	37.93	17.24	75.86
I am able to apply the knowledge of IPR for professional development.	44.83	37.93	17.24	75.86
I am able to develop a platform for protection and compliance of Intellectual Property Rights & knowledge	44.83	37.93	17.24	75.86
I am able to create awareness amidst academia and industry of IPR and Copyright compliance	48.28	34.48	17.24	77.01
I am able to deliver the purpose and function of IPR and patenting.	41.38	41.38	17.24	74.71

Seen

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE

(Deemed to be University)

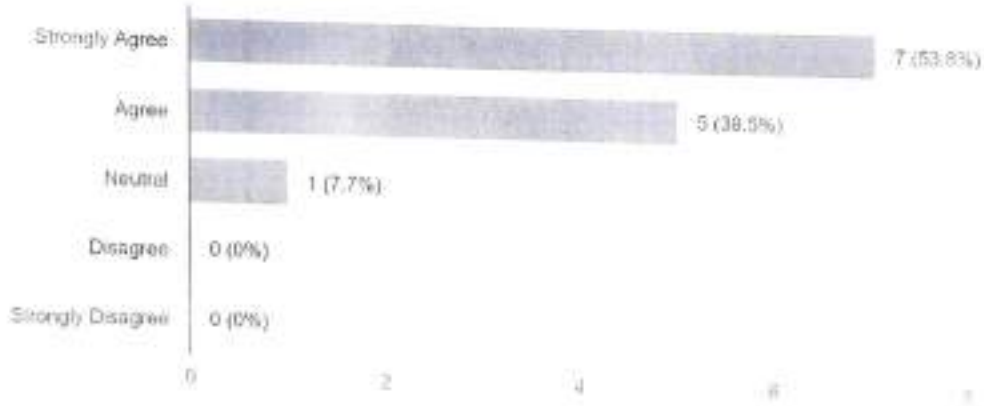
Department of CSE

ALUMNI FEEDBACK ANALYSIS

TOTAL RESPONSES: 13

Do you find yourself capable of making a good career ?

13 responses

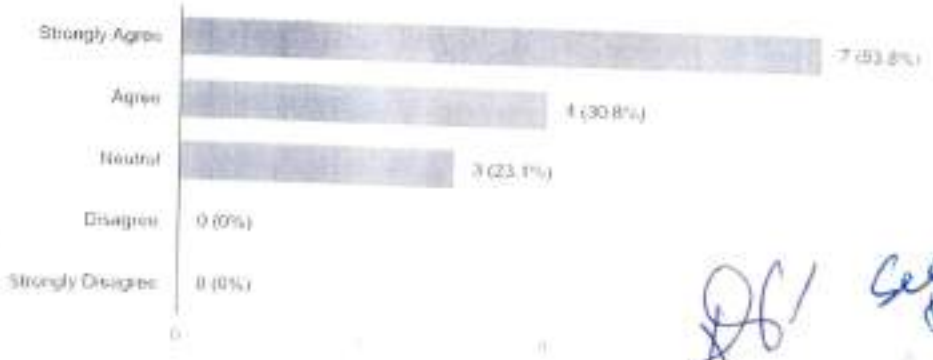


Do you feel that you are capable of learning new things in the constantly changing technological world.

13 responses

Are you able To apply, analyze, design and create products and solutions for real life Engineering problems?

13 responses



Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member /leader of multidisciplinary teams.

13 responses

Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member /leader of multidisciplinary teams.

13 responses

Total Responses: 13

Response sheet:

Timestamp	Name	Mobile Number	Email ID	Branch	College ID/ Enrollment ID	Do you find yourself capable of making a good career ?	Do you feel that you are capable of learning new things in the constantly changing technological world.	Are you able To apply, analyze, design and create products and solutions for real life Engineering problems ?	Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member /leader of multidisciplinary teams
5-14-2024 12:08:11	Nadeem Ahmad Baba	8491994475	nadeemhassan946@gmail.com	CSE	0901cs191063	Agree	Agree	Neutral	Strongly Agree
5-14-2024 12:13:27	Shubham Kumar Vaish	9131460706	deepak119907@gmail.com	CSE	0901CS191119	Strongly Agree	Agree	Strongly Agree	Strongly Agree
5-14-2024 12:13:43	Rishabh Saxena	7389981204	rishabh.saxena2002@gmail.com	CSE	0901CS191096	Agree	Agree	Agree	Strongly Agree
5-14-2024 12:15:52	Karishma Parashar	7223080661	karishmaparashar572@gmail.com	CSE	0901CS181053	Agree	Agree	Agree	Agree
5-14-2024 12:17:16	Priya garg	9993096246	priya326garg@gmail.com	CSE	0901CS191087	Neutral	Agree	Neutral	Agree
5-14-2024 12:27:13	Vivek singh kushwah	7987519280	Vivekskushwah16@gmail.com	CSE	0901CS161125	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5-14-2024 12:51:06	Swapnil Singh	8878805278	swappp7singh@gmail.com	CSE	0901CS131060	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5-14-2024 12:56:42	Prachi	6261250743	khadikarprachi@gmail.com	CSE	0901cs161076	Strongly Agree	Agree	Agree, Neutral	Strongly Agree, Agree
5-14-2024 18:02:48	Samarth Sharma	7987707657	bittu.samarth@gmail.com	CSE	0901CS181090	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5-14-2024 18:29:31	Gyan Gupta	9739295384	Gyanug@gmail.com	CSE		Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5-15-2024 8:01:21	Sandeep Singh Sikarwar	7722860885	s.sikarwar660@gmail.com	OTHER	0901it143d10	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
5-15-2024 11:13:07	Bharat chauhan	8305489450	singhchauhanbharat340@gmail.com	CSE	0901CS191029	Agree	Strongly Agree	Strongly Agree	Agree

5-16-2024 9:55:00	Nitesh Kushwaha	7828671762	ever4uniteshh@gmail.com	CSE	0901CS183D14	Agree	Agree	Agree	Agree

Dr. Gagandeep Kaur

Department Alumni Coordinator

Department of Computer Science and Engineering

Analysis Report on Employer Feedback

S. No.	Employer Name	Company/Organization Name	Feedback/Suggestions for Students	Feedback/Suggestions for the Institute
1.	Prashant Singh Hada hadaprashant2002@gmail.com	Persistent Digital Commerce Private Limited	He's a quick learner.	No comments, everything's fine
2.	Rohit Ahirwar rohitsindia@gmail.com	Engineering Innovations Research Lab Pvt Ltd	Good in team management	Train in Flutter development, Machine Learning
3.	Sneha S – HR careers@cosgrid.com	Cosgrid Systems Pvt Ltd	The student is skilled at building backend systems and integrating machine learning algorithms effectively	None
4.	Arvind Srivastava arvind.srivastava@zyvika.com	Zyvika	The student is technically strong, has good communication skills, and is a team player. He will be an asset to an organization.	
5.	Bhargav Reddy Dwarampudi d.bhargavreddy000143@gmail.com	Amazon	Java was a missing skill and our team uses Java widely but she was able to learn quickly and deliver in less time she is good at deep diving and helped other co-interns with her deep dive and finding new tools that are useful to our team which are used across Amazon.	Java is a must and widely used across Amazon. Add the courses related to the technologies used at Amazon (i.e., Java, AWS) quickly.
6.	Ankit Singh ankit.s@deltax.com	DeltaX	None	None

7.	Ajay Rathore ajayrathore.cosmitech@gmail.com	Cosmitech Infosystem Private Limited	the student is excellent and shows great potential	I suggest offering trending MOOC courses like the course in AI and mobile development
8.	Jayant Anand Choudhary jayantanand.choudhary@gmail.com	JC Solutions	None	None
9.	Rishabh Jain rishabh.jain@codingclub.tech	Coding Club India	Overall performance is satisfactory.	MITS, Gwalior, demonstrates a strong commitment to quality education, providing students with a solid foundation in both theoretical knowledge and practical skills. The institute's focus on industry-relevant training prepares graduates effectively for professional success.
10.	Awesh Divya Pandit awesh.d@optivaluetek.com	OPTIVALUETEK CONSULTING PVT LTD		SDLC, ML, AI, DevOps, Python, React.
11.	Nilesh Jarad nilesh.jarad701@gmail.com	Leadership Boulevard Pvt. Ltd	Outstanding performance throughout	None
12.	Krati Vyas (Team Lead) krati@innovqant.com	Innovquant Solution Pvt. Ltd		

13.	Vijay Rathore hrteambonasys@gmail.com	Bonasys IT Solutions Private Limited	Student have a good knowledge of their domain	Focus on AI, development, DevOps, and cloud technologies, not just on machine learning
14.	Vishal Jain vishal.j@numericinfosystem.com	Numeric Infosystem Private Limited	Excellent performance	All good
15.	Shivam Singhal shivam-singhal@newgensoft.com	Newgen Software Pvt.Ltd	He demonstrates strong skills in Java and consistently shows sincerity and discipline in his work. He participates actively in class and submits high-quality assignments on time. Overall, he is a dedicated and hardworking student	Yes, train in technologies like Java, Spring, React, etc.
16.	Anurag Khard anuarg.connect@gmail.com	Kloudspot		
17.	Ashutosh Rajoriya ashutosh@floobyte.com	Floobyte It Solutions	The student's knowledge of industry trends is impressive. MITS Gwalior seems to be providing a solid foundation for its students	It's great to see that MITS Gwalior is equipping its students with the knowledge and skills to stay current on industry trends.
18.	Elavarasi kumar elavarasi@nullclass.com	Nullclass EdTech Private Limited	The candidate is Polite and a quick learner.	You're rendering each individual capable of working by self.
19.	Ram Mohan Sharma ram.sharma@thehiringcompany.co.in	The Hiring Company	He is very honest towards his work and apart from it he was managing the decorum of my premise	As per the market standard MITS is delivering good content for students

20.	Anurag Singh Kushwah anurag@techrefic.com	Techrefic Technologies Private Limited	Talented, Hard-Working and Disciplined	Courses focusing on Blockchain can benefit students and employer more in upcoming future. MIT Gwalior is setting up their standard high, by pro-actively taking feedbacks from industrial experts, which i think will set MIT ahead from other institutes
21.	Anupma Singh hrteam.interviewcracker@gmail.com	Interview Cracker	Student possess good knowledge of the recent technologies, and is collaborative, attentive. She is well-versed to work effectively on any tech stack ahead.	As a suggestion, you can focus more on developing knowledge in the recent technologies such as Blockchain, AI, Cloud Computing, DevOps, Generative AI so that individuals will become industry ready.
22.	Shalini Singh shalini-singh@newgensoft.com	Newgen Software's Limited	The intern is performing cordially in his tasks.	The institute initiative to prepare the students for the placements as a whole is adequate.
23.	Vishal Verma vishalverma@indvibeinfotech.in	INDVIBE INFOTECH PRIVATE LIMITED	None	None
24.	Reecha Sanjiv Topinkatti reechat@tejasnetworks.com	Tejas Networks Private Limited	None	None
25.	Nitin Tripathi(HR Manager)	Cosmictech Infosystems Private Limited	Very Good	MITS Gwalior fosters a dynamic learning environment where innovation thrives ,

Seen

	hr.cosmic101@gmail.com			preparing students for impactful careers in engineering
26.	Rajesh Soni rajeshsoni.daphnysis@gmail.com	DAPHNISYS TECHNOLOGIES PVT. LTD.	Eager learner who thrived in both independent and team projects. The course designed is apt and up to date with the industry trends.	The CS program offered at MITS seems adequate and promising of making students ready for the latest tech trends.
27.	Piyush Shivhare sales.team@volmo.in	Volmo Electrical Pvt Ltd	All Good	All Good
28.	Vinay Kumar vinay.kumar4530@yahoo.com	RxLogix Corp.	None	None