MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department
of
Computer Science and Engineering

Agenda and Minutes
of
The BoS Meeting
CSE/CSD/M.Tech

BoS Meeting

Conducted on 02nd June 2023

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Agenda of the BoS

(Approved by the Academic Development Cell for all BoS Meetings Scheduled during June 2023)

The Meeting of Board of Studies (BoS) in Computer Science and Engineering was held on *02nd June 2023* (02:00 P.M. onwards). 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, Allahabad	External Member (Academics) ***(Nominee of Academic Council (AC), MITS Gwalior)***
4.	Dr. K.V Arya Professor, IIITM Gwalior	External Member (Academics) ***(Nominee of Academic Council (AC), MITS Gwalior)***
5.	Ravikant Sharma Assistant Vice President Citi Bank Singapore	External Member (Alumnus)
6.	Ms. Ruby Malhotra Co-Founder & Executive Director, Kailtech Test & Research Centre Pvt Ltd , Indore,	External Member (Industry)
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.	Dr. R. R. Singh Makwana, Assistant Professor	Member
12.	Mr. Amit Kumar Manjhvar, Assistant Professor	Member
13.	Dr. Ranjeet Kumar Singh, Assistant Professor	Member
14.	Ms. Smita Parte, Assistant Professor	Member
15.	Dr. Kuldeep Narayan Tripathi, Assistant Professor	Member
16.	Dr. Rohit Agrawal, Assistant Professor	Member
17.	Dr. Gagandeep Kaur, Assistant Professor	Member
18.	Dr. Devesh Kumar Lal, Assistant Professor	Member

19.	Dr. R. S. Jadon, Professor (Computer Application)	Member
20.	Dr. Anshu Chaturvedi, Professor (Computer Application)	Member
21.	Dr. Parul Saxena, Assistant Professor (Computer Application)	Member

In addition to above, students' members were also present.

1.	Ashutosh Panchal	Student Member
2.	Isha Awasthi	Student Member

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Agenda of the BoS Meeting

(Approved by Academic Development Cell of the institute - BoS Meeting Scheduled on 02nd June 2023)

1. *Minutes of the last BoS held on 14 Dec 2022 are confirmed by the house*
2. *Following are the points which are discussed as per the agenda in the BoS on 02 June 2023*

Instructions for preparing BoS Proceedings

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

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
Networking with TCP/IP	1 50512	2022	June 2023	10	9	Ann exur e 8	BOS June 2023
Computer Programming	3150122	2022	June 2023	25	15	Ann exur e 10	BOS June 2023
Computer Programming	3290122	2022	June 2023	25	15	Ann exur e 10	BOS June 2023

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
1.	Data Mining & Warehousing	150715	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.	3	7	
	Reinforcement Learning	150765	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.	4	7	
	Big Data Computing	150766	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	4	7	

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Computer Programming	3150122	2022	June 2023	25	15	Annexure 10	BOS June 2023
Computer Programming	3290122	2022	June 2023	25	15	Annexure 10	BOS June 2023

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Big Data Computing	150766	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	4	7	

		computing technologies. It provides an introduction to some 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	150767	In this course we will get introduced to the human-computer interfaces, concept of usability and its engineering.	4	7	
Deep Learning	150768	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.	4	7	
Software Testing	150769	This course will cover various techniques for test case design, as used for testing of software artifacts including requirements, design and code. We will discuss algorithms and techniques for test case design based on graphs, logic, syntax of programming languages and on inputs. Special techniques for testing object-oriented features and web applications will also be discussed. The course will end with symbolic testing techniques. These broadly will cover test cases for both white-box and black-box.	4	7	
Introduction To Game Theory And Mechanism Design	150770	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	4	7	

		discusses the mathematical details of analyzing and designing strategic interactions.			
Network Security	900222	The course emphasizes to give a basic understanding of previous attacks on cryptosystems with the aim of preventing future attacks. A wide variety of basic cryptographic primitives will be discussed along with recent developments in some advanced topics like identity-based encryption, attribute-based encryption, functional encryption, two-party/multi-party computation, bitcoin and crypto-currency and postquantum cryptography. The cryptanalysis part will help us understanding challenges for cybersecurity that includes network security, data security, mobile security, cloud security and endpoint security.	5	8	
Natural Language Processing	Honours	This course starts with the basics of text processing including basic pre-processing, spelling correction, language modeling, Part-of-Speech tagging, Constituency and Dependency Parsing, Lexical Semantics, distributional Semantics and topic models. Finally, the course also covers some of the most interesting applications of text mining such as entity linking, relation extraction, text summarization, text classification, sentiment analysis and opinion mining.	7	8	
Google Cloud Computing Foundations	Honours	The Google Cloud Computing Foundations course aims to provide students with little to no background or experience in cloud computing, a detailed overview of concepts covering cloud basics, big data, and machine learning and where and how the Google Cloud Platform fits in. The course involves understanding concepts and perform hands-on training (via Qwiklabs platform) to practice the learning	7	9	
Cloud Computing	Minor	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	7	8	

		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.			
Data Science	150511/290501	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-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.	9	9	
Artificial Intelligence	150515	The course introduces the variety of concepts in the field of artificial intelligence. It discusses the philosophy of AI, and how to model a new problem as an AI problem. It describes a variety of models such as search, logic, Bayes nets, and MDPs, which can be used to model a new problem. It also teaches many first algorithms to solve each formulation. The course prepares a student to take a variety of focused, advanced courses in various subfields of AI.	9	9	
Programming In Modern C++	Honours	The present course builds up on the knowledge of C++ programming and basic data structure (array, list, stack, queue etc.)	7	8	
Programming In Java	Honours	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	8	

Software Design & Project Management	290503	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.	9	9	
Design Patterns	290505	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.	9	9	
Design & Analysis of Algorithms	2150303	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, spanning trees 4. Design techniques: divide and conquer, greedy, dynamic programming 5. Data structures: heaps, union of disjoint sets, search trees 6. Intractability	12	10	
Database Management System	2150304	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.	12	10	
Software Engineering	2150305	Large scale software development poses special challenges. This course targets to expose the students to the challenges of large scale software development and would expose the students as to how to overcome those. Starting with basic life cycle model concepts, it would discuss requirements specification, design, and testing issues. The concepts will be illustrated with appropriate examples.	12	10	

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
Introduction To Game Theory	150770	This course is an introduction to game theory and mechanism design. The	4	7	

And Mechanism Design		goal is to equip students with a general purpose tool to analyze strategic behavior in multi-agent interaction. Management wing of any company that is interested in mathematical handling of strategic planning will have interest in this course.			
Google Cloud Computing Foundations	Honours	The Google Cloud Computing Foundations course aims to provide students with little to no background or experience in cloud computing, a detailed overview of concepts covering cloud basics, big data, and machine learning and where and how the Google Cloud Platform fits in. The course involves understanding concepts and perform hands-on training (via Qwiklabs platform) to practice the learning	7	8	
Design Patterns	290505	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.	9	9	
Software Design & Project Management	290503	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.	9	9	
Ad hoc Wireless Networks	150714	A wireless ad hoc network (WANET) is a type of local area network (LAN) that is built spontaneously to enable two or more wireless devices to be connected to each other without requiring typical network infrastructure equipment, such as a wireless router or access point.	3	7	

Feedback on curriculum received from stakeholders: Analysis& ATR*

Stakeholder	Student	Faculty	Alumni	Employer
No. of responses	818	15	34	20
Link of Analysis	**Annexure 14**	**Annexure 14**	**Annexure 14**	**Annexure 14**
ATR Link	**Annexure 14**	**Annexure 14**	**Annexure 14**	**Annexure 14**
Link showing Excel sheet of Google Form details of stakeholders	Curriculum Feedback Jan - June 2023 - Google Drive	Curriculum Feedback Jan -June 2023 - Google Drive	https://docs.google.com/spreadsheets/d/1YTELTq5tGkaU2ZjB2e-0V7JvJ2OUy1vfgNUQKO-y6g/edit?usp=sharing	Curriculum Feedback Jan -June 2023 - Google DriveCurriculum Feedback Jan -June 2023 - Google Drive

** 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 columnfor 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 14 December 2022
Item 2	To prepare and finalize the **scheme structure of B.Tech. VII Semester** with the provision of *Three Departmental Electives (DEs)***(in which two Departmental Elective is to be offered in online mode with credit transfer)***and one Open Category (OC) Course for the batch admitted in 2020-21.* **The scheme for B.Tech VII Semester, CSE discipline (under flexible curriculum) were discussed and finalized.** **The same is enclosed in Annexure 1 <VIEW>**
Item 3	To prepare and finalize the syllabus of courses to be offered ***(for the batch admitted in 2020-21)*** under ***Departmental Elective (DE) Course***(in traditional mode) for B. Tech. ***VII Semester*** along with their COs **The courses to be offered under Departmental Elective (DE-2) category (in offline mode) for B.Tech VII Semester, CSE discipline (under flexible curriculum) were discussed and finalized for Batch admitted in 2020-21. Subjects are: -** **1) Ad hoc wireless Networks <syllabus>** **2) Data Mining & Warehousing <syllabus>** **3) Distributed Systems <syllabus>** **The Syllabus of these courses are enclosed in Annexure 2**
Item 4	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in ***online mode under*** **Departmental Elective (DE)**Courses, with credit transfer in the B. Tech. ***VII Semester under*** the flexible curriculum (***for the batch admitted in 2020-21)*** **The list of Departmental Elective (DE-3, 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***

Course ID	*Course Name*	*Weeks*
noc23-cs100	*Reinforcement Learning*	*12 Weeks*
noc23-cs112	*Big Data Computing*	*8 Weeks*
noc23-cs116	*Design & Implementation of Human-Computer Interfaces*	*12 Weeks*

DE-4

Course ID	Course Name	Weeks
noc23-cs110	Deep Learning - IIT Ropar	12 Weeks
noc23-cs91	Software Testing (IIITB)	12 Weeks
noc23-cs117	Introduction To Game Theory And Mechanism Design	12 Weeks

In continuation, it is also discussed and recommended that the above-mentioned list of Departmental Elective (DE) course may be kept dynamic and newly emerging courses may be inducted in line with the industrial need and emerging developments (as and when required).

Item 5

To prepare and finalize the syllabus of courses to be offered ***(for the batch admitted in 2020-21)*** under the ***Open Category (OC) Courses*** **(in traditional mode)** for B. Tech. ***VII semester*** students of other departments along with 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 2020-21. Subjects are: -

1) Network Security <syllabus>
2) Computer Networks <Syllabus>

The syllabus is enclosed in Annexure 3

Item 6

To prepare and finalize the Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B. Tech. VII semester ***(for the batch admitted in 2020-21)***

The Departmental Laboratory Course (DLC) for B.Tech VII Semester, CSE discipline (under flexible curriculum) were discussed and finalized.

1) **Data Analytics Lab. <Syllabus>**

The list of Program and Skill Based Mini Projects is enclosed in Annexure 4

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 2020-21)] and for* B.Tech. ***V semester*** *(for the batch admitted in 2021-22)]*

[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the V semester CSE/CSD (for the batch admitted in 2021-22) and for VII semester students (for the batch admitted in 2020-21)] 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

V semester Minor

Course ID	Course Name	Weeks
noc23_cs67	Computer Architecture	12 Weeks
noc23-cs123	Operating System Fundamentals	12 Weeks
noc23-cs95	Programming, Data Structures And Algorithms Using Python	8 Weeks

V Semester Honours (Information Security Track)

Course ID	Course Name	Weeks
noc23_cs127	Cyber security and Privacy	12
noc23_cs75	Ethical Hacking	12

	V semester Honours (IOT Track)		
	noc23_cs83	*Introduction to Internet of Things*	*12*
	noc23_ee95	*Sensor Technologies: Physics, Fabrication, And Circuits*	*8*
	V semester Honours (High Performance Computing Track)		
	noc23_cs113	*Multi-Core Computer Architecture*	*12*
	noc23_cs72	*Distributed Systems*	*8*

VII semester Minor

Course ID	*Course Name*	*Weeks*
noc23-cs115	*Computer Graphics*	*8 Weeks*
noc23-cs89	*Cloud Computing*	*12 Weeks*
noc23-cs72	*Distributed Systems*	*8 Weeks*
noc23-cs101	Introduction To Operating Systems	8 Weeks
noc23-cs96	Design And Analysis Of Algorithms	8 Weeks

VII semester Honours

Course ID	*Course Name*	*Weeks*
noc23-cs77	*Computer Vision*	*12 Weeks*
noc23-cs80	*Natural Language Processing*	*12 Weeks*
noc23-cs90	*Google Cloud Computing Foundations*	*8 Weeks*
noc23-cs108	**The Joy Of Computing Using Python**	**12 Weeks**
noc23-cs74	**Programming In Java**	**12 Weeks**
noc23-cs78	**Programming In Modern C++**	**12 Weeks**
noc23-cs107	**Social Networks**	**12 Weeks**
noc23-cs69	**Privacy And Security In Online Social Media**	**12 Weeks**

Item 8

To prepare and recommend the ***scheme structure of B.Tech. V Semester under*** the flexible curriculum (for the *Batch admitted in 2021-22)*

The scheme for B.Tech V Semester, CSE discipline (under flexible curriculum) were discussed and finalized. The same is enclosed in <VIEW>

The scheme for B.Tech V Semester, CSD discipline (under flexible curriculum) were discussed and finalized. The same is enclosed in <VIEW>

The schemes of Vth Semester CSE and CSD is enclosed in Annexure 5

Item 9

To prepare and recommend the syllabi for all ***Departmental Core (DC) Courses*** of B. Tech. ***V Semester (for the batch admitted in 2021-22)*** under the flexible curriculum along with their COs.

Departmental Core (DC) Courses of V Semester CSE were discussed and finalized for Batch admitted in 2021-22. Subjects are: -

1) Data Science

	2) Networking with TCP/IP 3) Information Security 4) Compiler Design 5) Artificial Intelligence **The same is enclosed in here <VIEW>** **The Syllabus for Departmental Core (DC) Courses for V Semester CSE were discussed and finalized for Batch admitted in 2021-22.** **The syllabus, List of Experiments for Vth Sem CSE is enclosed in Annexure 6** **The Syllabus for Departmental Core (DC) Courses of V Semester CSD were discussed and finalized for Batch admitted in 2021-22. Subjects are: -** 1) Data Science 2) Networking with TCP/IP 3) Design Patterns 4) Compiler Design 5) Software Design & Project Management **The same is enclosed in here <VIEW>** **The syllabus, List of Experiments for Vth Sem CSD is enclosed in Annexure 6(a)**
Item 10	To prepare and recommend the suggestive Experiment list/ Lab manual and list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory component based courses to be offered in B. Tech. V Semester ***(for the batch admitted in 2021-22)***. **Skill based mini-project for Courses of V Semester CSE were discussed and finalized for Batch admitted in 2021-22.** **The same is enclosed in <VIEW>** **The Vth Sem CSE Skill Based Project is enclosed in Annexure 7** **Skill based mini-project for Courses of V Semester CSD were discussed and finalized for Batch admitted in 2021-22.** **The same is enclosed in <VIEW>** **The Vth Sem CSD Skill Based Project is enclosed in Annexure 7(a)**
Item 11	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for the batch admitted in 2021-22)*** in online mode under ***Self-Learning/ Presentation***, in the B. Tech. ***V Semester***

Course ID	*Course Name*	*Weeks*
noc23-cs118	*Introduction To Computer And Network Performance Analysis Using Queuing Systems*	*4 Weeks*
noc23-cs66	*Software Conceptual Design*	*4 Weeks*
noc23-cs81	*Software Testing (IITKGP)*	*4 Weeks*
noc23-de18	*Innovation By Design*	*4 Weeks*

	To review, prepare, finalize and recommend the ***Scheme & Syllabi (along with the Course Outcomes) of III semester*** **B. Tech. programmes (for the batch admitted 2022-23 Session)**

Item 12

The scheme & Syllabus for B.Tech III Semester, CSE discipline (under flexible curriculum) were discussed and finalized.
The Scheme is enclosed <VIEW>
The Syllabus is enclosed in <VIEW>

The III Sem CSE Scheme and Syllabus is enclosed in Annexure 8

The scheme & Syllabus for B.Tech III Semester, CSD discipline (under flexible curriculum) were discussed and finalized.
The Scheme is enclosed in <VIEW>
The Syllabus is enclosed in <VIEW>

The III Sem CSD Scheme and Syllabus is enclosed in Annexure 8(a)

Item 13

To review, prepare, finalize and recommend the list of experiments/ Lab manual and skill based mini projects for various laboratory courses to be offered in III Semester ***(for the batch admitted in 2022-23)***.

The list of experiments/ Lab manual and skill based mini projects for various laboratory courses (under flexible curriculum) were discussed and finalized and attached in Annexure 9

<VIEW>

Item 14

To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered ***(for the batch admitted in 2022-23)*** in online mode under ***Self-Learning/ Presentation***, in the ***III Semester***

Course ID	*Course Name*	*Weeks*
noc23-cs99	*Python For Data Science*	*4 Weeks*
noc23-cs93	*C Programming And Assembly Language*	*4 Weeks*
noc23-cs124	*Demystifying Networking*	*4 Weeks*

Item 15

To Review, prepare and recommend the scheme structure, Syllabi (along with the Course Outcomes), list of experiments/ Lab manual and skill based mini projects for various laboratory courses **of *I semester* B. Tech. programmes (for the batch admitted in 2023-24 Session)**

The scheme & Syllabus for B.Tech I Semester, CSE discipline (under flexible curriculum) were discussed and finalized.

Scheme <VIEW>
Syllabus <VIEW>

The I Sem CSE Scheme and Syllabus is enclosed in Annexure 10

The scheme & Syllabus for B.Tech I Semester, CSD discipline (under flexible curriculum) were discussed and finalized.

Scheme<VIEW>
Syllabus<VIEW>

The I Sem CSD Scheme and Syllabus is enclosed in Annexure10(a)

Item 16

To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for July-Dec 2022.

The CO attainments were reviewed and approved.
<VIEW>

	CO attainments is enclosed in Annexure 11
Item 17	To review PO attainment of 2018-2022 batch, CO-PO mapping matrix with attainments and gap analysis The PO attainment of 2018-2022 batch is reviewed & approved <VIEW> **PO attainments is enclosed in Annexure 12**
Item 18	To prepare and recommend the syllabi of Mandatory Audit Course: Universal Human Values & Professional Ethics (UHVPE). (at institute level) <VIEW> **Syllabi is enclosed in Annexure 13**
Item 19	To review curricula feedback from various stakeholders, its analysis and impact **{Stakeholder feedback analysis must also contain an Action Taken Report (ATR) and the details/data of the stakeholders who have responded through GOOGLE form (such as Name, organization, mail id, phone no., if available) must also be shared along with the feedback of the alumni/employer}** Student & Faculty Co/Curriculum <VIEW> Alumni <VIEW> **Feedback from various stakeholders is enclosed in Annexure 14**
Item 20	To review the Course Outcomes (COs) feedback of various courses, its analysis, and ATR (for July –Dec. 2022 semester) The Course Outcomes (COs) feedback of various courses were discussed and approved. <VIEW> **Course Outcomes (COs) feedback is enclosed in Annexure 15**
Item 21	To discuss and recommend the scheme structure & syllabi of PG Programme (M.E./M.Tech./MCA/MBA) along with their Course Outcomes (COs) The scheme for M.Tech I & III Semester, CSE discipline (under flexible curriculum) were discussed and finalized. Scheme <VIEW> Syllabus <VIEW> **The M.Tech. (CSE) Scheme and Syllabus is enclosed in Annexure 16**
Item 22	To 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 17**

Item 23	Any other matter The Syllabus of Creative problem solving Course, CSE VII semester were discussed and finalized. <VIEW>

Annexure-I

Scheme of
B.Tech VII
For batch admitted 2020-21

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Annexure-1

for batch admitted in Academic Session 2020-2021

B.Tech. VII Semester (Computer Science and Engineering)

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted									Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.
				Theory Slot				Practical Slot			MOOCs			L	T	P			
				End Sem.	Proficiency in subject /course	Mid Sem.Exam	Quiz/ Assignment	End Sem.	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	-		-	-	60	20	20	-	-	100	-	-	4	2	offline	SO
7.	150702	DLC	Summer Internship Project-III (04weeks) (Evaluation)	-		-	-	60	-	-	-	-	60	-	-	4	2	offline	SO
8.	150703	DLC	Creative Problem Solving(Evaluation)	-		-	-	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	2	-	-	GRADE	Online	MCQ

Additional Courses for obtaining Honours or minor Specialization by desirous students — Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

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	
											17
		Offline	Online			6	-	6	3	2	Credits %
	6	4	2	5	-	35	-	35	18	12	
	35	24	12	29	-						

Annexure-1

DE-2(Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	150714	Ad hoc Wireless Networks
2.	150715	Data Mining &Warehousing
3.	150716	Distributed Systems

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

DE-4*		
S. No.		Subject Name
1.	150768	Deep Learning - IIT Ropar
2.	150769	Software Testing (IIITB)
3.	150770	Introduction To Game Theory And Mechanism Design

OC-2		
S. No.	Subject Code	Subject Name
1.	910201	Network Security
2.	910202	Computer Networks

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

4 Software Conceptual Design

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Annexure-1

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

Honours* *(to be opted by students of Parent Department)*	**Minor Specialization*** *(to be opted by students of Other Department)*
Computer Vision	*Computer Graphics*
Natural Language Processing	*Cloud Computing*
Google Cloud Computing Foundations	*Distributed Systems*
The joy of computing using Python	*Introduction to Operating System*
Programming in Java	*Design and Analysis of Algorithms*
Programming in Modern C++	
Social Networks	
Privacy and security in Online Social Media	

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

Syllabus of
B.Tech VIIth Semester DE2 Courses
For batch admitted 2020-21

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Department of Computer Science and Engineering

Ad Hoc Wireless Networks

150714

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.	Analyze the performance of various Ad-hoc network protocols
CO5.	Examine the security challenges and issue of Ad-hoc wireless network
CO6.	Develop the solutions of various problems/Issues associated with ad-hoc networks

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Department of Computer Science and Engineering

DATA MINING & WAREHOUSING

150715

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:

Unit - I 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.

COS. explain data mining methods for identification of association for transactional databases.

CO6. Develop various classification and clustering algorithms for data using data mining.

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Department of Computer Science and Engineering

DISTRIBUTED SYSTEMS

150716

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.
CO6. Develop application for achieving various services of distributed system

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Annexure-3

Syllabus of
B.Tech VIIth Semester OC2 Courses
For batch admitted 2020-21

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

NETWORK SECURITY

910201

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, **Basic Number Theory:** Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, 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, Message Digest: MD5, SSH (Secure Shell), 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):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. **Firewalls:** Types, Functionality and Polices.

Unit -V

Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service. **Hacker:** Hacking and Types of Hackers, Footprinting, 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: define various aspects of network security.
CO2: illustrate fundamentals of number theory and cryptography.
CO3: apply security mechanisms to achieve principles of network security.
CO4: analyze the cause for various existing network attacks.
CO5: examine the vulnerabilities in applications over internet.
CO6: develop a secure protocol for achieving various network security services.

Annexure-I

Syllabus of
B.Tech VIIth Semester Lab Course (Data Analytics Lab)/
List of Experiments/List of Skill Based Mini Project
For batch admitted 2020-21

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

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 Create data visualizations using ggplot2 in R.
CO 4: To Perform statistical analyses using R.
CO 5: To Implement machine learning methodologies in R.
CO 6: To Conduct text mining, time series analysis, and utilize R Markdown for documentation.

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Department of Computer Science and Engineering

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.

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Department of Computer Science and Engineering

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.

Annexure 5

Syllabi of
Departmental Courses (DC) Courses
B.Tech V Semester
For batch admitted 2021-22
(Computer Science and Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

Scheme of Examination

B.Tech. V Semester (Computer Science and Engineering)

For batches admitted in Academic Session 2021-2

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									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Skill based mini project		L	T	P			
				End Term Evaluation	$Proficiency in subject /course												
1.	150511	DC	Data Science	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ
2.	150512	DC	Networking with TCP/IP	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP
3.	150513	DC	Information Security	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP
4.	150514	DC	Compiler Design	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP
5.	150515	DC	Artificial Intelligence	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP
6.	150516	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO
7.	150517	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	SO	SO
8.	150518	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	3	16	24		
10.	1000006	MAC	Disaster Management	50	10	20	20	-	-		100	2	-	-	Grade	MCQ	Online
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of (i) Honours in parent discipline or (ii) Minor Specialization in engineering discipline other than the parent discipline														

MCQ: Multiple Choice QuestionAO: Assignment + Oral OB: Open Book PP: Pen Paper

$compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation,

**Minor Project may be evaluated by internal committee for awarding sessional marks, MCQ:Multiple Choice Question AO:Assignment+Oral OB:OpenBook PP:PenPaper SO:Submission+Oral

Modeof Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLP/NEC	
Offline	Ouline	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
-	-	11	5	7	1	14		04	2	4	24
-	-	46	21	29	4	58		17	8	17	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
Scheme of Examination
B.Tech. V Semester (Computer Science and Design)

For batches admitted in Academic Session 2021-22

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									
				End Sem.		Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Skill based mini project		L	T	P			
				End Term Evaluation	[1]Proficiency in subject /course												
1.	290501	DC	Data Science	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ
2.	290502	DC	Networking with TCP/IP	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP
3.	290503	DC	Software Design & Project Management	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP
4.	290504	DC	Compiler Design	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP
5.	290505	DC	Design Patterns	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP
6.	290506	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO
7.	290507	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	SO	SO
8.	290508	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	250	120	40	950	13	3	16	24		
10.	1000006	MAC	Disaster Management	50	10	20	20	-	-		100	2	-	-	Grade	MCQ	Online
Additional Courses for obtaining Honours or minor Specialization by desirous students			Permitted to opt for maximum two additional courses for the award of (i) Honours in parent discipline or (ii) Minor Specialization in engineering discipline other than the parent discipline														

MCQ: Multiple Choice QuestionAO: Assignment + Oral , OB: Open Book PP: Pen Paper, [1]compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation, **Minor Project may be evaluated by internal committee for awarding sessional marks

MCQ:Multiple Choice Question AO:Assignment+Oral OB:OpenBook PP:PenPaper SO:Submission+Oral

Modeof Teaching						Modeo of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLF/NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
-	-	11	5	7	1	14		4	2	4	24
-	-	46	21	29	4	58	-	17	8	17	Credits %

Annexure 6

Syllabi of
Departmental Courses (DC) Courses & List of Experiments
B.Tech V Semester
For batch admitted 2021-22
(Computer Science and Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

DATA SCIENCE
150511

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:

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. 4. Pattern Recognition and Machine Learning, Christopher M. Bishop

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.
CO6: Apply regression techniques to solve real world problems.

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Department of Computer Science and Engineering

DATA SCIENCE
150511

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.

Department of Computer Science and Engineering

Networking with TCP/IP
150512

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.

Reference 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. Outline of the basic functionality of TCP/IP layers.

CO2. Analyze various addressing mechanism used in the internet

CO3. Elaborate the framing, Routing and Address translation mechanism used in the internet

CO4. Analyze the working of Application layer protocols

CO5. Simulate network protocols & Topologies

CO6. Install, maintain and troubleshoot a TCP/IP Network

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Department of Computer Science and Engineering

Networking with TCP/IP
(150512) old

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, IPv6 addressing.

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, Voice over IP.

Unit- 5 Troubleshooting Principles, Ping, Traceroute, nslookup and Netstat, Study of network packet analyzer tools: Wireshark, CISCO packet Tracer etc. Scanner Tools: Nmap, Nessus etc.

Reference 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. Outline of the basic functionality of TCP/IP layers.

CO2. Analyze various addressing mechanism used in the internet

CO3. Elaborate the framing, Routing and Address translation mechanism used in the internet

CO4. Analyze the working of Application layer protocols

CO5. Simulate network protocols & Topologies

CO6. Install, maintain and troubleshoot a TCP/IP Network

Department of Computer Science and Engineering

Information Security
150513

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. analyse the cause for various existing network attacks and describe the working of available security controls.

CO5. examine the vulnerabilities in IT infrastructure.

CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.

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Department of Computer Science and Engineering

Information Security
150513

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)

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Department of Computer Science and Engineering

COMPILER DESIGN
150514

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.

Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

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

CO1. Define the concepts of finite automata and context free grammar.

CO2. Build the concept of working of compiler.

CO3. Examine various parsing techniques and their comparison.

CO4. Compare various code generation and code optimization techniques.

CO5. Analyze different tools and techniques for designing a compiler.

CO6. Design various phases of compiler.

Department of Computer Science and Engineering

Artificial Intelligence
150515

Course Objectives:

- To acquire knowledge on intelligent systems and agents.
- Formalization of knowledge, reasoning with, machine learning, Fuzzy Logic and Applications at a basic level.

Unit: 1

Introduction: Need and Scope of Artificial Intelligence, History, Definition of Artificial Intelligence, Task and Objectives of Artificial Intelligence, Techniques of Artificial Intelligence. Artificial Intelligence Problems: Problems Definition, Problem Spaces and Production System. Characteristics of Production Systems, Types of Production System. Control Strategies, Example: water-jug, 8 – Puzzle, Cannibals & Missionaries problems.

Unit: 2

Agent: Introduction, Types of Agent, Searching techniques: Informed search and Uninformed search, Breadth search and Depth first search, Best First Search, Heuristic search. Heuristic estimation and evaluation, Hill climbing and their Problems.

Unit: 3

Knowledge Representation: Introduction, Definition and importance Of Knowledge, Approaches to knowledge Representation, Issues in Knowledge Representation, Procedural and Declarative Knowledge, Knowledge Representation Techniques: Logics, Prepositional Logic, Predicate Logic, Semantic networks.

Unit: 4

Learning Algorithms: Introduction of algorithms, characteristic of algorithm, Introduction of Machine Learning, Supervised learning, Unsupervised learning, Reinforcement learning.

Logical reasoning: Fuzzy Logic, operations of fuzzy logic. Forward Versus Backward Reasonings. Artificial Intelligence in Mathematics: Statistical concept (Mean, mode, median, standard deviation), Bayes theorem.

Unit: 5

Applications of Artificial Intelligence: Emerging fields of Artificial Intelligence, Introduction of Data science, Natural Language Processing, Speech Recognition, Computer Vision and robotics, Smart Assistants, Game Playing, Puzzles. Expert System: Expert System Definition and its components.

COURSE OUTCOMES:

After successful completion of the course, the learners would be able to:

CO1. Understand concepts & applications of Artificial Intelligence and different types of intelligent agents.
CO2. Formulate problems as state space search problem & efficiently solve them.
CO3. Evaluate the working of various informed, uninformed and heuristics searching algorithms.
CO4. Apply the concept of knowledge representation techniques.
CO5. Evaluate the various learning algorithms for solving problems.
CO6. Apply the AI task in real time Problems.

Reference Books:-

- Artificial Intelligence–Rich & Knight
- Artificial Intelligence and Expert System–Dan. W. Patterson
- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley

Annexure 6 (a)

Syllabi of
Departmental Courses (DC) Courses
B.Tech V Semester
For batch admitted 2021-22
(Computer Science and Design)
Under Flexible Curriculum

Department of Computer Science and Engineering

DATA SCIENCE
(290501)

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:

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. 4. Pattern Recognition and Machine Learning, Christopher M. Bishop

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.
CO6: Apply regression techniques to solve real world problems.

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DATA SCIENCE
(290501)
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

Networking with TCP/IP
(290502)

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.

COURSE OUTCOMES

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

CO1. Outline of the basic functionality of TCP/IP layers.

CO2. Analyze various addressing mechanism used in the internet

CO3. Elaborate the framing, Routing and Address translation mechanism used in the internet

CO4. Analyze the working of Application layer protocols

CO5. Simulate network protocols & Topologies

CO6. Install, maintain and troubleshoot a TCP/IP Network

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Department of Computer Science and Engineering

SOFTWARE DESIGN AND PROJECT MANAGEMENT

(290503)

COURSE OBJECTIVES

To understand the nature of software design process models, SCRUM and Agile practices.

- To understand role of project manager.
- To understand project management and scheduling techniques.
- To understand concept of software quality assurance and risk management process.

Unit-I

Introduction to Software Design and Project Management: 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, Project and Product Life Cycles, role of project manager, System view of project management, Barry Boehm: W5HH principle

Unit-II

Fundamentals of Agile: The 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.

Unit- III

Agile Scrum Framework: 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: Function Point calculation, 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, 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: Understand software design methodologies.

CO2: Apply and recognize project management practices.

CO3. Understand user stories, tasks and Agile methodology.

CO4: Understand and Apply Project Scheduling techniques.

CO5: Recognize Quality Assurance and Control Techniques

CO6: Examine the Risks and Managing.

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Software Design and Project Management
(290503)
List of Lab Experiments

1. Create your first project in JIRA SCRUM.
2. Learn and create Epic, Story and Tasks
3. Create a To-Do Daily Task Management Project in JIRA and set priorities
4. Manage Agile boards
5. Create and build Roadmaps
6. Sprint Planning in JIRA
7. Backlogs and Integrate WBS Gantt Chart.
8. Scheduling Project, Integrate with PERT, PERT estimates.
9. Create Story points, creating versions, releases, and burndown charts.
10. Create a "upgrading to a new phone Project" in JIRA.
11. Learn JIRA Query Language (JQL) and perform queries to retrieve required data
12. Smart querying, save filters, export csv file
13. Understanding Administrative rights, Creating and Inviting Users, Creating groups, permissions, and project roles.
14. Creating multiple boards per project, creating boards from saved filters, Creating Workflows
15. Adding transitions and status in JIRA.
16. Case Study of Online Grocery Shopping using JIRA
17. Case Study of Online Movie ticket booking using JIRA

Department of Computer Science and Engineering

COMPILER DESIGN
(290504)

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.

Unit-V

Code Generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

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

CO1. Define the concepts of finite automata and context free grammar.

CO2. Build the concept of working of compiler.

CO3. Examine various parsing techniques and their comparison.

CO4. Compare various code generation and code optimization techniques.

CO5. Analyze different tools and techniques for designing a compiler.

CO6. Design various phases of compiler.

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Department of Computer Science and Engineering

Design Patterns

(290505)

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

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.

CO6.Apply the appropriate design pattern compatible with different use cases.

Annexure 7

Skill Based Mini-Projects
B.Tech V Semester
For batch admitted 2021-22
(Computer Science and Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
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Department of Computer Science and Engineering

DATA SCIENCE
150511

SKILL BASED MINI-PROJECTS

- 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.
- 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.
- 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.
- Image Recognition: Create an image recognition system using convolutional neural networks (CNNs) to classify or identify objects, faces, or patterns in images.
- 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.
- 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.
- 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).
- 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.
- 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.
- 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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Department of Computer Science and Engineering

Information Security
150513

SKILL BASED MINI PROJECTS

1. Email monitoring
2. Web application firewall
3. Log Analyzer
4. Malware Analysis Sandbox
5. Encryption Software
6. Caesar code Decoder
7. User authentication system
8. Image Steganography system
9. Anomaly detection, intrusion and its prevention

Annexure 7(a)

Skill Based Mini-Projects
B.Tech V Semester
For batch admitted 2021-22
(Computer Science and Design)
Under Flexible Curriculum

DATA SCIENCE
(290501)
SKILL BASED MINI-PROJECTS

- 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.
- 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.
- 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.
- Image Recognition: Create an image recognition system using convolutional neural networks (CNNs) to classify or identify objects, faces, or patterns in images.
- 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.
- 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.
- 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).
- 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.
- 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.
- 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.

Software Design and Project Management
(290503)

List of Skill Based Project

The Skill Based Project is to be designed Using JIRA

1. Marketing Project Management
2. Recruitment Project Management
3. Voting System Project Management
4. Hotel Room Booking Management
5. Make My Trip Management
6. Health Care Management
7. Police Service Management
8. Purchasing Project Management
9. Banking Services Management
10. Library Service Management

Annexure-8

Scheme and Syllabus of
B.Tech IIIrd Semester CSE
For batch admitted 2022-23

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. III 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									
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project		L	T	P				
1.	2150301	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
2.	2150302	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	2150303	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
4.	2150304	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2150305	DC	Software Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2150306	DLC	JAVA Programming	-	-	-	-	60	20	20	100	-	-	2	1	offline	SO	
7.	2150307	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.	2150308	DLC	Summer Internship Project–I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
Total				**250**	**50**	**100**	**100**	**290**	**100**	**60**	**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 Sciences & 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								
		11	5	5	2	18	-	-	1	4	23
		48	22	22	8	79			4	17	Credits %

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. III 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	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2150301	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
2.	2150302	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	2150303	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
4.	2150304	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2150305	DC	Software Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2150306	DLC	JAVA Programming	-	-	-	-	60	20	20	100	-	-	2	1	offline	SO	
7.	2150307	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.	2150308	DLC	Summer Internship Project–I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
Total				**250**	**50**	**100**	**100**	**290**	**100**	**60**	**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 Sciences & Skills	Language	50	10	20	20	30	10	10	150	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								
		11	5	5	2						
		48	22	22	8	18	-	-	1	4	23
						79			4	17	Credits

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Department of Computer Science and Engineering

DISCRETE STRUCTURES

(2150301)

COURSE OBJECTIVES:

- To perceive the knowledge of basic algebra
- To use logical notation to define fundamental mathematical concepts
- To familiarize predicate & propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function.

Unit 1:

Finite and infinite sets, mathematical induction, Principles of inclusion and exclusion, functions and relations, summations, binary relations, equivalence relations, Congruence Relation and partitions, partial ordering relations and lattices, Pigeonhole principle.

Unit 2:

Propositional logic, syntax, semantics of Atf (atomic formula), Wff'(well formed formula's),validity and satisfiability of wff' by Quine's method, Normal and closure form of prepositional calculus.

Unit 3:

Basic of Graph Theory as a Discrete Structure, planner graphs, Graph Coloring, multi-graphs and weighted graph, shortest path in weighted graph, Introduction to Eularian paths and circuits, Hamiltonian paths and circuits, Introduction to trees, rooted trees, Path length in rooted trees, spanning trees and cut trees.

Unit 4:

Introduction to discrete numeric functions and generating functions, Introduction to recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Unit 5:

Introduction to group, subgroups, generations and evaluation of power, cosets and Lagrange's theorem, group codes, isomorphism and automorphism, homomorphism and normal sub groups, ring, integral domain and field.

RECOMMENDED BOOKS:

- J. Tremblay and R. Manohar: Discrete Mathematical Structures with Application to Computer science. • Narsingh Deo: Graph Theory.
- C.L.Liu: Discrete Mathematics.
- K.H. Rosen: Discrete Mathematics and its Applications
- S. Lipschutz, Discrete Mathematics

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1. Understand logical notation to define and reason mathematically about the fundamental data types and structures used in computer algorithms and systems.

CO2. Outline various mathematical concepts along with their applications.

CO3. Implement the applications of various types of graphs to solve real life problem.

CO4. Apply the mathematical concepts to solve engineering problems.

CO5. Analyze the set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.

CO6. Design analytical skill and interpret applications of engineering in real time troubleshooting.

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Department of Computer Science and Engineering

OPERATING SYSTEMS
(2150302)

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
CO6. Develop the Solution of various operating system problems/issues

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Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS
(2150303)

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.

CO6: Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
(2150304)

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: TransactionProcessing 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 modeling and Normalization approach.

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

CO6. Formulate, using relational algebra and SQL, solutions to a broad range of query Problems.

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Department of Computer Science and Engineering

SOFTWARE ENGINEERING
(2150305)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit-I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, Software model: Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection criteria of model: Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit – III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit – V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Explain the various fundamental concepts of software engineering.

CO2. Develop the concepts related to software design & analysis.

CO3. Compare the techniques for software project management & estimation.

CO4. Choose the appropriate model for real life software project.

CO5. Design the software using modern tools and technologies.

CO6. Test the software through different approaches.

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Departmental Lab Course
JAVA PROGRAMMING
(2150306)

COURSE OBJECTIVES

- To understand fundamentals of Java programming such as variables, conditional and iterative execution, and methods.
- To understand fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries.
- To create a computer program to solve specified real world problems.

Unit 1

Introduction to Java Programming, Introduction to Java and its features, Java Development Kit (JDK) installation and setup, Java development environment (IDE) usage, Java syntax and basic programming concepts, Variables, data types, and operators, Control structures: decision-making and loops

Unit 2

Object-Oriented Programming in Java, Object-oriented programming (OOP) concepts: classes, objects, inheritance, polymorphism, and encapsulation, Java classes and objects, Constructors and methods, Inheritance and interfaces, Packages and access control.

Unit 3

Exception Handling and File Handling, Exception handling: try-catch blocks, multiple catch clauses, and exception hierarchy, Throwing and catching exceptions, File I/O operations: reading from and writing to files, Working with streams and readers/writers, File handling best practices and error handling

Unit 4

Java Collections Framework, Overview of Java Collections Framework (JCF), Lists, Sets, and Maps in JCF, ArrayList, LinkedList, HashSet, TreeSet, HashMap, TreeMap, etc., Working with collections: adding, retrieving, updating, and deleting elements, Iterators and iterating over collections

Unit 5

Multithreading and Java GUI Programming, Multithreading concepts: threads, synchronization, and inter-thread communication, Creating and managing threads in Java, Thread synchronization and deadlock prevention, Introduction to Java GUI (Graphical User Interface) programming Event-driven programming and handling GUI events, Swing components and layout management

Reference Books

1. "Java: A Beginner's Guide" by Herbert Schildt (McGraw-Hill Education)
2. "Effective Java" by Joshua Bloch (Addison-Wesley Professional)
3. "Head First Java" by Kathy Sierra and Bert Bates (O'Reilly Media)
4. "Java: The Complete Reference" by Herbert Schildt (McGraw-Hill Education)
5. "Java Concurrency in Practice" by Brian Goetz et al. (Addison-Wesley Professional)

Course Outcomes

After completion of the course students would be able to:

CO1. Demonstrate proficiency in Java programming syntax, control structures, and data types to develop functional applications.

CO2. Apply object-oriented programming principles, including inheritance, polymorphism, and encapsulation, to design and implement robust Java applications.

CO3. Implement exception handling techniques and file input/output operations to ensure program stability and data persistence.

CO4. Utilize the Java Collections Framework to effectively manage and manipulate data structures, such as lists, sets, and maps.

CO5. Design and develop multithreaded applications, incorporating synchronization mechanisms to ensure thread safety and efficiency.

CO6. Create interactive graphical user interfaces (GUI) using Java Swing components, incorporating event-driven programming to enhance user experience.

Annexure-8(a)

Scheme and Syllabus of
B.Tech IIIrd Semester CSD
For batch admitted 2022-23

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. III Semester *(CSD)*

(for batch admitted in academic session 2022-2

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.	2290301	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
2.	2290302	DC	Operating Systems	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	2290303	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
4.	2290304	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2290305	DC	Software Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2290306	DLC	JAVA Programming	-	-	-	-	60	20	20	100	-	-	2	1	offline	SO	
7.	2290307	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.	2290308	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
Total				**250**	**50**	**100**	**100**	**290**	**100**	**60**	**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 Sciences & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	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

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								
		11	5	5	2	18	-	-	1	4	23
		48	22	22	8	79			4	17	Credits %

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DISCRETE STRUCTURES (2290301)

COURSE OBJECTIVES:

- To perceive the knowledge of basic algebra
- To use logical notation to define fundamental mathematical concepts
- To familiarize predicate & propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function.

Unit 1:

Finite and infinite sets, mathematical induction, Principles of inclusion and exclusion, functions and relations, summations, binary relations, equivalence relations, Congruence Relation and partitions, partial ordering relations and lattices, Pigeonhole principle.

Unit 2:

Propositional logic, syntax, semantics of Atf (atomic formula), Wff (well formed formula's), validity and satisfiability of wff by Quine's method, Normal and closure form of prepositional calculus.

Unit 3:

Basic of Graph Theory as a Discrete Structure, planner graphs, Graph Coloring, multi-graphs and weighted graph, shortest path in weighted graph, Introduction to Eularian paths and circuits, Hamiltonian paths and circuits, Introduction to trees, rooted trees, Path length in rooted trees, spanning trees and cut trees.

Unit 4:

Introduction to discrete numeric functions and generating functions, Introduction to recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Unit 5:

Introduction to group, subgroups, generations and evaluation of power, cosets and Lagrange's theorem, group codes, isomorphism and automorphism, homomorphism and normal sub groups, ring, integral domain and field.

RECOMMENDED BOOKS:

- J. Tremblay and R. Manohar: Discrete Mathematical Structures with Application to Computer science. • Narsingh Deo: Graph Theory.
- C.L.Liu: Discrete Mathematics.
- K.H. Rosen: Discrete Mathematics and its Applications
- S. Lipschutz, Discrete Mathematics

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1. Understand logical notation to define and reason mathematically about the fundamental data types and structures used in computer algorithms and systems.

CO2. Outline various mathematical concepts along with their applications.

CO3. Implement the applications of various types of graphs to solve real life problem.

CO4. Apply the mathematical concepts to solve engineering problems.

CO5. Analyze the set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.

CO6. Design analytical skill and interpret applications of engineering in real time troubleshooting.

Department of Computer Science and Engineering

OPERATING SYSTEMS (2290302)

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
CO6. Develop the Solution of various operating system problems/issues

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Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS (2290303)

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.
CO6: Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM (2290304)

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: TransactionProcessing 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 modeling and Normalization approach.
CO5. Apply transaction processing concepts and recovery methods over real time data.
CO6. Formulate, using relational algebra and SQL, solutions to a broad range of query Problems.

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Department of Computer Science and Engineering

SOFTWARE ENGINEERING
2290305

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit-I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, Software model: Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection criteria of model: Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit – III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit – V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Explain the various fundamental concepts of software engineering.
CO2. Develop the concepts related to software design & analysis.
CO3. Compare the techniques for software project management & estimation.
CO4. Choose the appropriate model for real life software project.
CO5. Design the software using modern tools and technologies.
CO6. Test the software through different approaches.

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Department of Computer Science and Engineering

Departmental Lab Course
JAVA PROGRAMMING
(2290306)

COURSE OBJECTIVES

- To understand fundamentals of Java programming such as variables, conditional and iterative execution, and methods.
- To understand fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries.
- To create a computer program to solve specified real world problems.

Unit 1

Introduction to Java Programming, Introduction to Java and its features, Java Development Kit (JDK) installation and setup, Java development environment (IDE) usage, Java syntax and basic programming concepts, Variables, data types, and operators, Control structures: decision-making and loops

Unit 2

Object-Oriented Programming in Java, Object-oriented programming (OOP) concepts: classes, objects, inheritance, polymorphism, and encapsulation, Java classes and objects, Constructors and methods, Inheritance and interfaces, Packages and access control.

Unit 3

Exception Handling and File Handling, Exception handling: try-catch blocks, multiple catch clauses, and exception hierarchy, Throwing and catching exceptions, File I/O operations: reading from and writing to files, Working with streams and readers/writers, File handling best practices and error handling

Unit 4

Java Collections Framework, Overview of Java Collections Framework (JCF), Lists, Sets, and Maps in JCF, ArrayList, LinkedList, HashSet, TreeSet, HashMap, TreeMap, etc., Working with collections: adding, retrieving, updating, and deleting elements, Iterators and iterating over collections

Unit 5

Multithreading and Java GUI Programming, Multithreading concepts: threads, synchronization, and inter-thread communication, Creating and managing threads in Java, Thread synchronization and deadlock prevention, Introduction to Java GUI (Graphical User Interface) programming Event-driven programming and handling GUI events, Swing components and layout management

Reference Books

1. "Java: A Beginner's Guide" by Herbert Schildt (McGraw-Hill Education)
2. "Effective Java" by Joshua Bloch (Addison-Wesley Professional)
3. "Head First Java" by Kathy Sierra and Bert Bates (O'Reilly Media)
4. "Java: The Complete Reference" by Herbert Schildt (McGraw-Hill Education)

5. "Java Concurrency in Practice" by Brian Goetz et al. (Addison-Wesley Professional)

Course Outcomes

After completion of the course students would be able to:

CO1. Demonstrate proficiency in Java programming syntax, control structures, and data types to develop functional applications.

CO2. Apply object-oriented programming principles, including inheritance, polymorphism, and encapsulation, to design and implement robust Java applications.

CO3. Implement exception handling techniques and file input/output operations to ensure program stability and data persistence.

CO4. Utilize the Java Collections Framework to effectively manage and manipulate data structures, such as lists, sets, and maps.

CO5. Design and develop multithreaded applications, incorporating synchronization mechanisms to ensure thread safety and efficiency.

CO6. Create interactive graphical user interfaces (GUI) using Java Swing components, incorporating event-driven programming to enhance user experience.

Annexure-9

B.Tech IIIrd Semester CSE/ CSD

The list of experiments/ Lab manual

and

skill based mini projects

for various laboratory courses

For batch admitted 2022-23

(Computer Science & Engineering)

Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR-474005
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Department of Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHM
2150303
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.

COURSE OUTCOMES

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

CO1. Relate the principles of algorithm design in solving problems.

CO2. Demonstrate basic algorithms and different problem solving strategies.

CO3. Build creativeness and confidence to solve non-conventional problems.

CO4. Analyze running times of algorithms using asymptotic analysis.

CO5. Compare various algorithm design approaches for solving real world problems.

CO6. Design and implement optimization algorithms in specific applications

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Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS
(2150303)

SKILL BASED MINI PROJECTS

1. Sudoku:
   - Develop a GUI based 3x3 grid Sudoku game, place numbers from 1 to 9.

2. Calendar:
   - Develop a GUI based calendar which stores days of week and the months.

3. Online Bookstore:
   - Develop an application for bookstore which efficiently handles operations like searching, inserting, deleting, and updating books.

4. Banking System:
   - Design a program for banking system which has customer accounts that need to be stored and managed.

5. Snake Game:
   - Develop a snake game where user controls the snake's movement and can't crash into the wall or itself. The snake's size increases by eating items on the game board.

6. To-Do List:
   - Implement CRUD (Create, Read, Update and Delete) operations.

7. Tower of Hanoi Puzzle:
   - Develop Tower of Hanoi puzzle game where 3 pegs will be there and disks will move from starting peg to destination peg.

8. Tic-Tac-Toe Game:
   - Develop a GUI based 3x3 grid game; there should be two players, one with X another with O.

9. Music Playlist:
    - Develop a music playlist which having music track and some information about particular track like the title, artist, etc.

10. Library Management System:
    - Create a program to manage library and organize their resources.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM

2150304 (DC)

List of Experiment

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 function 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.
11. Study and implementation of Rollback, Commit, Save point.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
2150304(DC)
List of Skill Based Mini Project

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

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JAVA PROGRAMMING
(2150306)
LIST OF EXPERIMENTS

Experiment 1: Setting up the Java Development Environment
- Install the Java Development Kit (JDK) and an Integrated Development Environment (IDE).
- Write a simple "Hello, World!" program and execute it.

Experiment 2: Implementing Basic Control Structures
- Write a program that demonstrates the use of if-else statements for decision-making.
- Implement loops (for, while) to iterate over a set of numbers or perform a specific task.

Experiment 3: Creating and Manipulating Objects
- Design a class representing a student with relevant attributes and behaviors.
- Create multiple instances of the class and invoke methods to perform operations on the student objects.

Experiment 4: Inheritance and Polymorphism
- Create a base class and derived classes to showcase inheritance.
- Demonstrate polymorphism by invoking methods overridden in derived classes.

Experiment 5: Exception Handling
- Write a program that throws and catches different types of exceptions.
- Handle exceptions using try-catch blocks to prevent program termination.

Experiment 6: File Handling
- Read data from a text file and display its content.
- Write data to a file and verify the successful write operation.

Experiment 7: Working with Java Collections
- Create a collection (e.g., ArrayList) and perform operations like adding, retrieving, and removing elements.
- Iterate over a collection using iterators and demonstrate different collection classes.

Experiment 8: Multithreading
- Create multiple threads and execute them concurrently.
- Implement synchronization mechanisms to prevent thread interference.

Experiment 9: GUI Application Development
- Design a graphical user interface (GUI) using Swing components.
- Implement event handlers for GUI components, such as buttons or text fields.

Experiment 10: Comprehensive Project
- Design and implement a comprehensive Java project that incorporates concepts covered throughout the syllabus.
- Examples could include creating a student management system or a simple game using GUI elements.

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JAVA PROGRAMMING
(2150306)
LIST OF EXPERIMENTS

Experiment 1: Setting up the Java Development Environment
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- Create a base class and derived classes to showcase inheritance.
- Demonstrate polymorphism by invoking methods overridden in derived classes.

Experiment 5: Exception Handling
- Write a program that throws and catches different types of exceptions.
- Handle exceptions using try-catch blocks to prevent program termination.

Experiment 6: File Handling
- Read data from a text file and display its content.
- Write data to a file and verify the successful write operation.

Experiment 7: Working with Java Collections
- Create a collection (e.g., ArrayList) and perform operations like adding, retrieving, and removing elements.
- Iterate over a collection using iterators and demonstrate different collection classes.

Experiment 8: Multithreading
- Create multiple threads and execute them concurrently.
- Implement synchronization mechanisms to prevent thread interference.

Experiment 9: GUI Application Development
- Design a graphical user interface (GUI) using Swing components.
- Implement event handlers for GUI components, such as buttons or text fields.

Experiment 10: Comprehensive Project
- Design and implement a comprehensive Java project that incorporates concepts covered throughout the syllabus.
- Examples could include creating a student management system or a simple game using GUI elements.

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JAVA PROGRAMMING
(2150306)
SKILL BASED MINI PROJECTS

1. Student Management System:
   - Design a console-based application to manage student information.
   - Implement functionalities like adding, deleting, and displaying student records.
2. Library Management System:
   - Create a program to manage library operations, including book borrowing, returning, and searching.
   - Implement data structures to store book records efficiently.
3. Calculator Application:
   - Develop a GUI-based calculator application using Swing components.
   - Implement basic arithmetic operations and handle user input.
4. File Encryption and Decryption:
   - Create a program to encrypt and decrypt files using encryption algorithms.
   - Provide options for the user to select the encryption method and specify the file to encrypt/decrypt.
5. Quiz Application:
   - Develop a quiz application that presents multiple-choice questions to the user.
   - Implement a scoring system and display the result at the end of the quiz.
6. Bank Account Management System:
   - Design a program to manage bank accounts, including features like account creation, deposit, withdrawal, and balance inquiry.
   - Implement object-oriented concepts to model bank accounts and transactions.
7. Contact Management Application:
   - Develop a console-based application to manage contacts.
   - Implement functionalities like adding contacts, searching by name, and displaying contact details.
8. Tic-Tac-Toe Game:
   - Create a GUI-based Tic-Tac-Toe game using Swing components.
   - Implement game logic to handle player turns and determine the winner.
9. Weather Forecast Application:
   - Develop a program that retrieves weather data from an API and displays it to the user.
   - Implement features like displaying current weather, forecast for multiple days, and location-based search.
10. Online Shopping System:
    - Design a simple online shopping system with features like browsing products, adding items to the cart, and placing orders.
    - Implement shopping cart functionality and user authentication.

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Department of Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHM

2290303

List of Programs

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.

COURSE OUTCOMES

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

CO1. Relate the principles of algorithm design in solving problems.
CO2. Demonstrate basic algorithms and different problem solving strategies.
CO3. Build creativeness and confidence to solve non-conventional problems.
CO4. Analyze running times of algorithms using asymptotic analysis.
CO5. Compare various algorithm design approaches for solving real world problems.
CO6. Design and implement optimization algorithms in specific applications

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Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS
(2290303)

SKILL BASED MINI PROJECTS

1. Sudoku:
   - Develop a GUI based 3x3 grid Sudoku game, place numbers from 1 to 9.

2. Calendar:
   - Develop a GUI based calendar which stores days of week and the months.

3. Online Bookstore:
   - Develop an application for bookstore which efficiently handles operations like searching, inserting, deleting, and updating books.

4. Banking System:
   - Design a program for banking system which has customer accounts that need to be stored and managed.

5. Snake Game:
   - Develop a snake game where user controls the snake's movement and can't crash into the wall or itself. The snake's size increases by eating items on the game board.

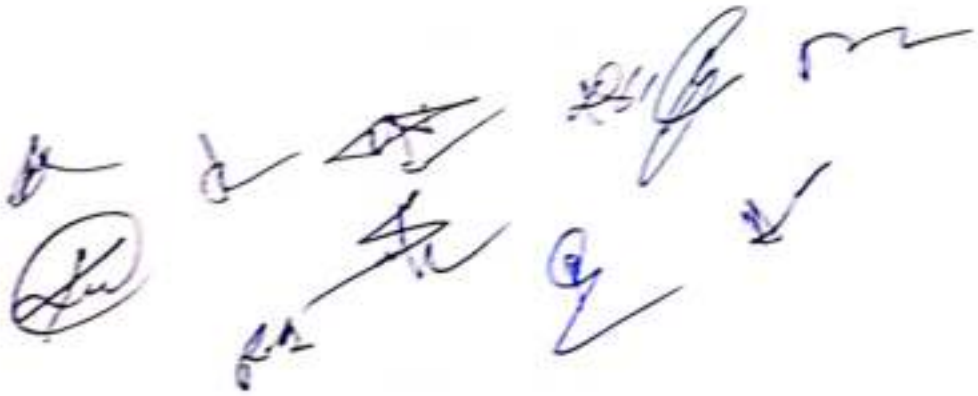
6. To-Do List:
   - Implement CRUD (Create, Read, Update and Delete) operations.

7. Tower of Hanoi Puzzle:
   - Develop Tower of Hanoi puzzle game where 3 pegs will be there and disks will move from starting peg to destination peg.

8. Tic-Tac-Toe Game:
   - Develop a GUI based 3x3 grid game; there should be two players, one with X another with O.

9. Music Playlist:
   - Develop a music playlist which having music track and some information about particular track like the title, artist, etc.

10. Library Management System:
   - Create a program to manage library and organize their resources.



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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM

2290304 (DC)

List of Experiment

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 function 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.
11. Study and implementation of Rollback, Commit, Save point.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
2290304 (DC)
List of Skill Based Mini Project

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

JAVA PROGRAMMING (2290306)

LIST OF EXPERIMENTS

Experiment 1: Setting up the Java Development Environment
- Install the Java Development Kit (JDK) and an Integrated Development Environment (IDE).
- Write a simple "Hello, World!" program and execute it.

Experiment 2: Implementing Basic Control Structures
- Write a program that demonstrates the use of if-else statements for decision-making.
- Implement loops (for, while) to iterate over a set of numbers or perform a specific task.

Experiment 3: Creating and Manipulating Objects
- Design a class representing a student with relevant attributes and behaviors.
- Create multiple instances of the class and invoke methods to perform operations on the student objects.

Experiment 4: Inheritance and Polymorphism
- Create a base class and derived classes to showcase inheritance.
- Demonstrate polymorphism by invoking methods overridden in derived classes.

Experiment 5: Exception Handling
- Write a program that throws and catches different types of exceptions.
- Handle exceptions using try-catch blocks to prevent program termination.

Experiment 6: File Handling
- Read data from a text file and display its content.
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Experiment 10: Comprehensive Project
- Design and implement a comprehensive Java project that incorporates concepts covered throughout the syllabus.
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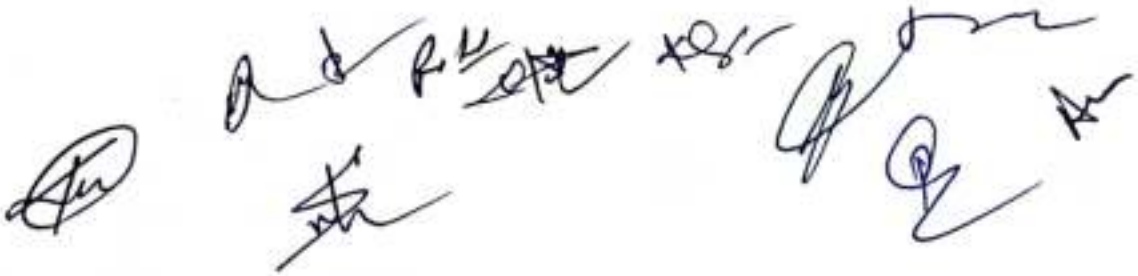

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JAVA PROGRAMMING (2290306)
SKILL BASED MINI PROJECTS

1. Student Management System:
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   - Implement features like displaying current weather, forecast for multiple days, and location-based search.
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    - Design a simple online shopping system with features like browsing products, adding items to the cart, and placing orders.
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Annexure-10

Scheme and Syllabus of
B.Tech I Semester CSE
For batch admitted 2023-24

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. I Semester *(Computer Science and Engineering)*

(for batch admitted in academic session 2023-2

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: [5]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.	3150121	DC	Digital Electronics	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	3150122	DC	Computer Programming	50	10	20	20	40	30	30	200	2	1	2	4	Blended	AO	2 Hrs
3.	3150123	DC	Emerging Technologies in Computer Science	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
4.	3100011	BSC	Engineering Mathematics-I	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
5.	3100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
6.	3150124	DLC	IT workshop	-	-	-	-	40	30	30	100	-	-	2	1	Offline	SO	-
Total				**250**	**50**	**100**	**100**	**120**	**90**	**90**	**800**	**12**	**04**	**06**	**19**	-	-	-
7.	3000002	Natural Sciences & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

[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 Science/ Language

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

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	Total
Offline	Online	Blended: Offline	Blended: Online	Offline	PP	AO	MCQ	SO	
4	-	8	4	3	10	4	4	1	19
21		42	21	16	53	21	21	5	

(ACADEMICS)
M.I.T.S.
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DIGITAL ELECTRONICS
(3150121)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra, and logic gates.
- To understand the concept of counters, latches, and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications, Prime Implicants and Essential Prime Implicants definition.

Unit-III

Combinational Circuits, Half Adder, Half Subtractor, Full Adder and Full Subtractor, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the computer architecture for defining basic component and functional unit.
CO2. recall different number system and solve the basic arithmetic operations.
CO3. develop the understanding of combinational circuits.
CO4. analyze the basic concept of sequential circuits.
CO5. compare various memories.
CO6. solve the boolean functions using logic gates.

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Department of Computer Science and Engineering

Computer Programming

(2150122)

COURSE OBJECTIVES:

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To study the concepts of procedural and object oriented programming.
- To design and implement basic programming solutions using programming constructs.

Unit I

Introduction to Programming, types of computer programming languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C++ Programming: Data Types, Constants, Keywords, variables, input/output, Operators & Expressions, Precedence of operators.

Unit II

Control Statements and Decision Making: goto statement, if statement, if-else statement, nesting of if statements, The switch statement, while loop, do...while loop, for loop, nesting of for loops, break and continue statement. Function Basics, Function Prototypes, Passing Parameter by value and by reference, Default Arguments, Recursion. Arrays: One dimensional Arrays, Multidimensional Arrays, Passing Arrays to Functions.

Unit III

Strings, Pointers, Structures and File handling:, operations on Strings, Basics of Pointers & Addresses, reference variable, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings. Dynamic memory allocation using new and delete operators. Structures & Union, Pointer to Structure, Self-Referential Structures. File Concepts, Study of Various Files and Streams, operations on files.

Unit IV

Object Oriented Paradigm, Features of OOPS, Comparison of Procedural Oriented Programming with Object Oriented Programming, Abstract Data Types, Specification of Class, Visibility Modes, Defining Member Functions, Scope Resolution Operator, Constructors, its types, and Destructors, Creating of Objects, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Friend Function.

Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath.

RECOMMENDED BOOKS:

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusamy.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES:

After completing this, the students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: develop algorithms and flowchart for a given problem.

CO3: understand the concepts of procedural programming.

CO4: explain the concepts of object oriented programming and its significance in the real world.

CO5: analyze the problems and choose suitable programming techniques to develop solutions.

CO6: develop computer programs to solve real world problems.

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Department of Computer Science and Engineering

3150122- COMPUTER PROGRAMMING

COURSE OBJECTIVES

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To design and implement programming solutions for problem solving.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if- else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
- Paul Deitel and Harvey M. Deitel , How to Program, Pearson Publication.
- Yashavant Kanetkar , Let Us C, BPB publication.
- E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: describe the basic principles of procedural programming.

CO3: develop algorithms and flowchart for a given problem.

CO4: analyze the problems and choose suitable programming techniques to develop solutions.

CO5: design, implement, debug and test programs.

CO6: design computer programs to solve real world problems.

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Department of Computer Science and Engineering

Computer Programming

List of Experiment

Computer Programming(3150122)

1. Write a Program to Check Whether a Number is Even or Odd
2. Write a Program to Check Leap Year
3. Write a Program to find the sum of the first n natural numbers
4. Write a Program to convert string from lower case to upper case
5. Write a program to find the sum of array elements
6. Write a program to print String using Pointer
7. Write a program to swap two numbers using pointers
8. Write a Program to read the first line from a file
9. Write a Program to write a sentence on a file
10. Write a Program Binary to decimal conversion

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List of Skill-Based Mini-projects

Computer Programming

(3150122)

1. Design a program to implement the Tic tac toe game
2. Design a program to implement the basic operation of the Leave Management System
3. Generate a Student report card system using a C program.
4. Design a program that can generate a Calendar for any year.
5. Design a program that demonstrates the operations performed by an ATM Machine.
6. Design a program to create a Number System Conversion system.
7. Design a program to implement the basic operation of the Department Store Management System
8. Design a program to implement the basic operation of the Library Management System
9. Design a program to implement the basic operation of the Bus Reservation System
10. Design a program to implement a Periodic Table.
11. Design a program to implement a Digital clock

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

Emerging Technologies in Computer Science
(3150123)

Course Objectives:

1. To acquire knowledge of trending and emerging technologies along with their principles, issues, challenges, and mechanisms.
2. To provide a conceptual understanding of modern tools and techniques for Big data Analytics, Artificial intelligence, Cyber Security, and IoT.

Unit I – Artificial Intelligence:

Introduction: Need and Scope of AI, History, Definition of AI, Techniques of AI, Characteristics of AI applications, Basic Search Techniques, General problem solving, Speech Recognition, Natural Language Processing, Computer Vision, Introduction of expert systems

Unit II – Cloud Computing:

Introduction to cloud computing, Software as a service, platform as a service, and infrastructure as a service. Cloud deployment model: Public cloud, Private clouds, Community clouds and Hybrid clouds. Virtualization: Compute virtualization, Storage virtualization, Full and paravirtualization.

Unit III – Cyber Security:

Overview of Cyber Security, Cyber-crime, Cyberwarfare, cyber Terrorism, Cyber espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software piracy, Cyber Security Threats and Vulnerabilities: Hacker, Types of Hacker- white, Gray and black, Malicious Software: Virus, Worm, Trojan Horse, Backdoors and Spywares, Sniffers, Denial of Service attack and Phishing.

Unit IV – Internet of Things:

IoT definition, Characteristics, IoT conceptual and architectural framework, Components of IoT ecosystems, Review of Basic Microcontrollers and interfacing, Basic components and challenges of a sensor, Sensor features, RFID: Features & working principle.

Unit V - Big Data Analytics:

Introduction to Big data, Big data characteristics, Traditional data versus Big data, Evolution of Big data, challenges with Big Data, Technologies available for Big Data, Use of Data Analytics, Hadoop Ecosystem, Core Hadoop components, ETL Processing

COURSE OUTCOMES:

After successful completion of the course, the learners would be able to:

1. Illustrate concepts & applications of Artificial Intelligence.
2. Describe the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability benefits, as well as current and future challenges;
3. Understand the basics of Cyber Security and working knowledge
4. Analyze various Cyber Security Threats and Vulnerabilities
5. Understand the Internet of Things and its hardware and software components.
6. Define the concept and challenges of Big Data, along with the basic understanding of Big Data Solutions using the Hadoop Eco System

Reference Books:-

- RadhaShankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition
- Rich & Knight - Artificial Intelligence
- Kai Hawang, Geoferrey C Fox, "Distributed and Cloud Computing"
- Cryptography and Network Security Principles and Practice Fourth Edition, William Stallings, Pearson Education
- Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

Engineering Mathematics –I
(3100011)

Objective of Course

- To understand the techniques of differential and integral calculus in engineering problems
- To expose the concept of ordinary and partial differentiation
- To explore with matrix and its applications
- To understand Boolean algebra and graph theory

Unit 1:

Maclaurins's and Taylor's theorem, Partial differentiation, Euler's theorem, Jacobian, Maxima and Minima of one and two variables, Convergence of Sequence, and Series Test.

Unit 2:

Definite integral as a limit of a sum, application in summation of series, Beta and Gamma function and its properties, the transformation of Beta function, Gama functions, the transformation of Gama function, the relation between Beta and Gama function, Legendre's duplication formula, double & triple integral, Change of the order of integration, Length of the curves, Volumes and surfaces.

Unit 3:

Ordinary differential equations of first and higher order, Linear higher order differential equations with constant coefficients, Homogeneous linear differential equations, and Simultaneous differential equations.

Unit 4:

Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit 5:

Introduction to Algebra of Logic, statement, Logical connector, Types of Conditional statement, Logical equivalence, CNF and DNF, Algebraic laws, De morgan's laws, Boolean algebra, Principle of duality basic theorems, Boolean expressions and function, DNF and CNF

form and Switching circuit.
Graph Theory, graph, Types of graphs, walk, path, circuit, Hamiltonian graph, Euler graph and its applications, Tree, Spanning tree and its properties.

Course Outcomes

After completing this course, students will be able to:

CO's	Description of COs
CO1	Apply differential Calculus to basic engineering problems
CO2	Use integration techniques to determine the solution to various complex problems
CO3	Solve the differential equations by various methods
CO4	Solve the problem of the matrix.
CO5	Concept of Boolean algebra and graph theory.

Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt.Ltd, 5th Edition (2016).
4. F. B . Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice-Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015)..
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

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Basic Electrical & Electronics Engineering

(3100022)

Course Objectives:

- To impart the basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer and its terminology.
- To make familiarize the students about the working of rotating electrical machine, various electronic circuits and its importance.

Unit I - D.C. Circuits Analysis:

Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit II –Single-phase AC Circuits:

Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit III- Magnetic Circuits:

Basic definitions, AC excitation in magnetic circuits, self-inductance and mutual inductance, Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Flux,MMF and their relation, analysis of magnetic circuits.

Unit IV- Single-phase Transformer &Rotating Electrical Machines:

Single phase transformer, Basic concepts, construction and working principal, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.

Unit V - Digital Electronics, Devices & Circuits:

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations

Recommended Books:

1. Basic Electrical and Electronics Engineering, D.P. Kothari & I.J. Nagrath-Tata McGraw Hill
2. Basic Electrical and Electronics Engineering, V N Mittle & Arvind Mittal -Tata McGraw Hill
3. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson
4. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
5. Principles of Electrical Engineering- Vincdent Del Toro- Prentice Hall.
6. Basic Electrical Engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
7. Integrated Electronics- Millmann & Halkias
8. Electronics Devices & circuits- Sanjeev Gupta, Dhanpat Rai Publication
9. Basic Electrical and Electronics Engineering, D.C Kulshreshtha-Tata McGraw Hill

Course Outcomes

After the completion of the course, the student will be able to –

CO 1. **Solve** dc & ac circuits by applying fundamental laws & theorems

CO 2. **Compare** the behavior of electrical and magnetic circuits for given input

CO 3. **Explain** the working principle, construction, applications of rotating electrical machines

CO 4. **Explain** the working principle, constructional details, losses & applications of single phase transformer.

CO 5. **Select** the logic gates for various applications in digital electronic circuits.

CO 6. **Explain** characteristics of Diode and Transistor.

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Basic Electrical & Electronics Engineering Lab

(100022)

LIST OF EXPERIMENT

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single phase A.C circuit.
5. To determine voltage ratio & current ratio of a single phase transformer.
6. To determine the polarity of a single phase transformer.
7. To perform open circuit & short circuit test on a single phase transformer.
8. To study multimeter& measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

Course Outcomes:

After the completion of the lab, the student will be able to -

CO 1. Verify circuit theorems.

CO 2. Perform tests on transformer for determination of losses, efficiency & polarity.

CO 3. Acquire teamwork skills for working effectively in groups

CO 4. Prepare an organized technical report on experiments conducted in the laboratory.

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Basic Electrical & Electronics Engineering Lab

(100022)

Skill-Based Mini Project

1. Enlist the different electrical loads available in your home and prepare their rating chart.
2. Design the residential house wiring using fuse, switch, and indicator, lamp and energy meter. Also apply the Thevenin's theorem for finding the current in a particular branch of the circuit.
3. If one FTL (Fluorescent Tube Light)is replaced by LED bulb.
   A. Calculate the Monthly electrical energy saving?
   B. Calculate the monthly savings in electricity bill?
   Note: LUX level of FTL and LED bulbs must be the same (follow BEE Guide lines).Consider electricity bill charges from MP VidyutVitran company website.
4. What is the use of condenser in a ceiling fan? Draw a wiring diagram for the testing of motor winding.
5. Find the different ways/ Methodologies/ Guidelines, by which energy can be conserved in domestic applications?
6. Design a working model for controlling one lamp by two 2-way switch.
7. Visit the electrical machine lab and enlist different types of AC and DC motors along with their ratings. Also mention their industrial applications.
8. Visit the panel room and identify the different safety practices followed by electrical engineer.
9. Enlist different measuring instruments available in electrical workshop lab. Also prepare a comparison chart for Analog and digital measuring instruments.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Computer Science and Engineering

IT WORKSHOP

(3150124)

COURSE OBJECTIVES:

- To Understand the basics principles of computer, internet and computer security
- To Understand the basic productive IT tools
- To Learn the language of the web: HTML & CSS
- To learn and understand Python programming basics and paradigm

UNITI

Introduction & evolution of the internet, Study of various internet-based services like Email, social network, chat, web browsers, google services, etc. Introduction to cyber security and cyber laws, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with viruses, worms, and other cyber-attacks.

UNIT II

Professional word documents excel spreadsheets and power point presentations using the Microsoft suite of office tools, Operating System and Software Installations: Introduction to the operating system. Operating system types & evolution of operating system, Introduction to software, Types of software i.e., MS office, Media players,Winrar etc.

UNIT III

Introduction to html, html text editors, html building blocks, html tags, html attributes, html elements, html formatting, html heading, html paragraphs, html phrase tags, html anchors, html images, html tables, html list, html form, html with CSS, html classes, html frames, html Java scripts

UNIT IV

Introduction to python, Unique features of Python, Python-2 and Python-3 differences, Install Python and Environment Setup, First Python Program,Python Identifiers, Keywords and Indentation, Comments and document interlude in Python, Command line arguments.

UNIT V

Getting User Input, Python Data Types, What are variables?, Python Core objects and Functions, Number and Math's, Control Statements, List, Python Dictionaries and Sets, Input and Output in Python, Python built in function, Case study using HTML, Case study using Python.

RECOMMENDED BOOKS:

[1]. VamsiKurama, "Python Programming: A Modern Approach", Pearson India, 2017. [2]. Charles Severance, " Python for Informatics- Exploring Information", 1stedition Shroff Publishers, 2017.

[2] Thomas A. Powell " Thecomplte references HTML and CSS", Fifth edition, Mc Graw Hill Publication.

COURSE OUTCOMES:

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

CO1: Understand the basic concept and structure of application software.

CO2: Identify the existing configuration of the computers and peripherals.

CO3: Integrate the PCs into local area network and re-install operating system and various application programs.

CO4: Design and develop basic web pages using HTML and CSS.

CO5: Design & create and implement a static and dynamic webpage

CO6: Design and implement a program to solve a real world problem.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Computer Science and Engineering

IT WORKSHOP

(3150124)

List of Experiments

1) Apply the following operation on Excel Spreadsheet

Deleting a Column or a Row
Inserting a Row
Sorting
Displaying Formulas in the Worksheet
Copying Cells, Columns or Rows
Justification of Cell Contents

2) Perform the following Function on Excel Spreadsheet

AutoSum
Max
Min
Average

3) Write a program to describe various text formatting commands.
4) Create an HTML Login form.
5) Create a google form for the registration of students using google services.
6) Write a Program to create a simple layout of the Webpage.
7) Write a Program to divide a page into Frames.
8) Write a python program to swap two variables without using a temporary variable.
9) Write a program two find largest number among three numbers.
10) Write a Python programs that makes use of conditional and control flow structures

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Department of Computer Science and Engineering

IT WORKSHOP

(3150124)

SKILL BASED PROJECTS

1. Design & implement a login form in HTML.
2. Design & implement a registration form for a college event.
3. Design & implement your dynamic portfolio page.
4. Create an animation with the help of HTML & CSS.
5. Create a Google classroom for your subject.
6. Design & implement a calculator in python.
7. Create your blog by using Google blogger.
8. Create YouTube channel or monetization it.
9. Create an alarm by python.
10. Create a Quiz game in python.

Engineering Chemistry
(3000002)
(Natural Sciences & Skills)

COURSE OBJECTIVES:

- Enable the students to become familiar with the concepts of Modern Engineering Chemistry

  Develop an understanding of complex topics in correlation to Chemical analysis and applications. So that they could be applied to engineering and applications. Help students develop an understanding of the reactions and analysis-related problems in day-to-day life/ industry/engineering field.

Unit I - Chemistry of Water Analysis

Source and impurities, alkalinity, pH, hardness of water, the interrelationship between alkalinity and hardness, degree of hardness, Standards of water for drinking purposes, Methods of water softening: lime- soda process, zeolite, and ion exchange resin process. Scale formation: causes, effects, and prevention. Caustic embitterment, priming, foaming, boiler corrosion, and deaeration. Simple numerical problems on water softening based on the lime soda process and water analysis

Unit II - Chemistry of Engineering Material

Lubricants-Introduction, functions of lubricants, types, and classification of lubricants, solid lubricants, semi-solid lubricants, liquid lubricants, synthetic lubricants, lubricating emulsions, biodegradable lubricants, mechanism of lubrication, physical & chemical properties, testing of lubricants, types of greases, application of lubricants and silicones, selection of lubricants.

Cement: introduction & raw materials, gypsum cement, Types of cement, Methods of manufacturing cement: Wet process, Dry process, Semi-dry process. Chemistry of setting & Hardening of cement, Types of Portland cement, and its derivatives.

Refractory. Introduction, classification of refractories, and properties of refractories with reference to Refractoriness, RUL, Porosity, Thermal Spalling

Unit III - Chemicals of industrial importance

Fuels- Definition & Classification of fuels and their comparison. Calorific values, Determination of calorific value by Bomb calorimeter. Proximate and ultimate analysis of coal and their significance, Varieties of fuel oils, their properties and uses, knocking, anti-knocking compounds (octane &cetane number), simple numerical problems based on fuels.

Unit IV - Polymers of Engineering importance

Introduction, types and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization and their mechanism,

Classification of plastic, important thermoplastic resins Nylon 66, Teflon, Polystyrene & important thermosetting resins Phenolic resin, Amino resin. Moulding of plastics.Natural & synthetic rubbers, Vulcanization, styrene rubber, polyurethanes, silicon rubber, reclaimed rubber, Introduction to polymer composites, Engineering Plastics, Polymer in medicine and surgery and conducting polymers

Unit V - Standard Methods of Chemical Analysis

Introduction to Chromatography- Classification of Chromatography Methods, Principle of Chromatographic Mechanisms, Terminology Used in Chromatography, Chromatographic Performance, Isolation of Separated Components (Elution), Column, Thin layer and paper Chromatography. Principle, Instrumentation and application of Gas Chromatography.

Introduction to Spectroscopy-Ultra-Violet, and Visible Spectroscopy, Theory of ultraviolet visible spectroscopy, Types of electronic transitions, Chromophore, Auxochrome, Absorption and intensity shifts, The Absorption law. Instrumentation and Applications of ultraviolet-visible spectroscopy. Introduction of IR Spectroscopy.

RECOMMENDED BOOKS:

- Engineering Chemistry- P.C.Jain and Monika Jain, Dhanpat Rai *Publishing* Co (P) Ltd, 2013
- Engineering Chemistry - B.K. Sharma, Krishna Publication, 2015
- A Text Book of Engineering Chemistry - S. S. Dara & A.K. Singh, S. Chand Publication, 2015.
- Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age Pub, 2008.
- Polymer Science – Ghosh, Tata McGraw Hill.2010
- Chemistry for Environmental Engineering - Sawyer, McCarty and Parkin – McGraw Hill, International.2003
- Industrial Chemistry - B.K. Sharma, GOEL Publishing house 2011

COURSE OUTCOMES:

After completion of the course students would be able to:

CO1: Integrate the importance of water treatment for domestic and Industrial purposes

CO2: Acquire knowledge of the types, properties, and applications of advanced Engineering materials like lubricants, fuels.

CO3: Appreciate the knowledge of the types, properties, and application of advanced polymer materials, cement, refractories.

CO4: Perform simple and complex calculations through problem-solving methods.

CO5: Summarize the concept of chromatography and spectroscopy for various engineering applications related to day to day life.

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List of Experiments

Subject Name: Engineering Chemistry laboratory
Subject code 3000002 (Under Flexible Scheme-2019-20)
B.Tech. (First / Second semester) with effect from 01.07.2022

NOTE: At least 10 of the following experiments must be performed during the session.

Experiment No.	Aim of experiment
1	Determination of Total hardness by Complexometric titration.
2	Determination of temporary and permanent hardness by Complexometric titration.
3	Determination of alkalinity of given water sample by neutralization Titration. (a) OH^- & CO_3^{2-} (b) CO_3^{2-} & $HCO3^-$
4	Determination of percentage of Fe in Iron alloy solution by redox titration.
5	Determination of percentage of Cr in Chromium alloy solution by back titration.
6	Determination of Cu in Copper alloys solution by Iodometric Titration.
7	Determination of Viscosity of given oil sample by Redwood viscometer No.1
8	Determination of Flash & fire points of given oil sample by Pensky Martin close cup Apparatus.
9	Determination of Flash & fire point of given oil sample by Cleveland's open cup Apparatus.
10	Determination of Moisture content, volatile matter content, Ash content and fixed Carbon of a given sample of coal by proximate analysis.
11	Separation of the colour pigment of spinach leaf by paper chromatography.
12	Preparation of phenol formaldehyde resin by condensation polymerization.
13	Preparation of urea formaldehyde resin by condensation polymerization.

Course outcomes

Lab CO	After attending the lab in Engineering Chemistry (100101) the student will be able to:
CO1	Develop experimental skills required for the application of chemistry in engineering.
CO2	Operate different chemicals and instruments specified in the course safely and efficiently.
CO3	Analyze water samples, lubricants, fuel, alloys, and ores for different properties
CO4	Function as a member of a problem-solving team

Skill-Based Mini Project

Guidelines for delivering the Project:

Students will have to deliver a 10 Minute presentation preferably on PowerPoint.

1. The student can choose a topic of their choice but the same should be from the syllabi.
2. The students will have to communicate the same to the teacher in advance before delivering the same, and getting the topic approved. The teacher can change, modify, and suggest one instead.
3. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
4. Student will also have to submit a written report based on that.
5. The said activity has to be completed before the teaching ends.
6. He will be judged on basis of Presentation rubrics.

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Annexure-10(a)

Scheme and Syllabus of
B.Tech I Semester CSD
For batch admitted 2023-24

(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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ssDepartment of Computer Science and Engineering

Scheme of Evaluation

B. Tech. I Semester *(Computer Science and Design)*

(for batch admitted in academic session 2023-2

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	[$]Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	3290121	DC	Introduction to Computer Science and Design	50	10	20	20	-	-	-	100	3	-	-	3	Blended	MCQ	2 Hrs
2.	3290122	DC	Computer Programming	50	10	20	20	40	30	30	200	2	1	2	4	Blended	AO	2 Hrs
3.	3250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
4.	3100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
5.	3290123	DC	Digital Electronics	50	10	20	20	40	30	30	200	3	-	2	4	Blended	PP	2 Hrs
Total				**250**	**50**	**100**	**100**	**120**	**90**	**90**	**800**	**13**	**03**	**06**	**19**	-	-	-
7.	3000002	Natural Sciences & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.																		

[$]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 Science/ Language

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

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	Total Credits
Offline	Online	Blended		Offline	PP	AO	MCQ	SO	
		Offline	Online						
4	-	8	4	3	8	4	7	-	19
21		42	21	16	42	21	37		

DEAN (ACADEMICS)
M.I.T.S.
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Department of Computer Science and Engineering

INTRODUCTION TO COMPUTER SCIENCE AND DESIGN
(3290121)
(DC)

COURSE OBJECTIVES:

- To understand the basics of computers.
- To familiarize the students with various design techniques.
- To implement design solutions using digital logic, algorithms, computer networks and software development techniques.

Unit I - Biology for Engineers:

Basic Cell Biology: Origin of life, Cell theory, Cell Structure and function, Brief introduction to Bio-engineering, Genetic Engineering, Basics of biosensors its applications, Fundamental concept of Bioinformatics, Applications of Bioinformatics, Artificial Intelligence in Biology, Biometrics system, component of Biometric system.

Unit II - Introduction to Computer:

Introduction, Generation of computers, Classification of Computers, Hardware components, the system bus. Computer memory and its types, memory hierarchy. Computer software - System software, application software. Operating system, its types, and services. Booting.

Unit III - Digital Logic Design:

Von-Neumann Model, Various Subsystems, Binary numbers, Number Base Conversions, Complements, Signed Binary numbers, Binary Codes, Digital Logic Gates, Representation of sign (sign-magnitude, two's complement). Boolean Algebra, expressions, and truth tables.

Unit IV - Computer Network Design:

Introduction: Computer Network, Type s- LAN, MAN & WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway, and Modem,

Unit V - Software Design:

The evolving role of software, changing nature of software, software myths. Software engineering, Software Development cycle, Models: The waterfall model, incremental models, evolutionary models. Levels of Software design.

RECOMMENDED BOOKS:

- Introduction to Bioinformatics by Attwood, T.K. & Parry-Smith, D.J., Delhi, Pearson Education (Singapore) Pte.Ltd., 2001.
- Biology For Engineers by Singal Rajiv, CBS Publishers & Distributors Pvt. Ltd. 2020, 1st edition.
- Fundamentals of Computer Engineering, E. Balagurusamy, Tata McGraw Hill Education Pvt. Ltd.
- Introduction of Computers: Peter Norton, TMH
- Computer Networks: Andrew Tananbaum, PHI
- Basic Computer Engineering: Silakari and Shukla, Wiley India

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COURSE OUTCOMES:

After completion of the course students would be able to:
CO1: Define the fundamentals of computer systems.
CO2: Outline various components of the computer system.
CO3: Analyse the basics of digital circuit design techniques.
CO4: Select appropriate methods to design algorithms for problem-solving using computers.
CO5: Explain the importance of computer networks.
CO6: Choose suitable development tools to create web-based applications for solving real-world problems.

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(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Computer Science and Engineering

COMPUTER PROGRAMMING

(2290122)

COURSE OBJECTIVES:

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To study the concepts of procedural and object oriented programming.
- To design and implement basic programming solutions using programming constructs.

Unit I

Introduction to Programming, types of computer programming languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C++ Programming: Data Types, Constants, Keywords, variables, input/output, Operators & Expressions, Precedence of operators.

Unit II

Control Statements and Decision Making: goto statement, if statement, if-else statement, nesting of if statements, The switch statement, while loop, do...while loop, for loop, nesting of for loops, break and continue statement. Function Basics, Function Prototypes, Passing Parameter by value and by reference, Default Arguments, Recursion. Arrays: One dimensional Arrays, Multidimensional Arrays, Passing Arrays to Functions.

Unit III

Strings, Pointers, Structures and File handling:, operations on Strings, Basics of Pointers & Addresses, reference variable, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings. Dynamic memory allocation using new and delete operators. Structures & Union, Pointer to Structure, Self-Referential Structures. File Concepts, Study of Various Files and Streams, operations on files.

Unit IV

Object Oriented Paradigm, Features of OOPS, Comparison of Procedural Oriented Programming with Object Oriented Programming, Abstract Data Types, Specification of Class, Visibility Modes, Defining Member Functions,. Scope Resolution Operator, Constructors, its types, and Destructors, Creating of Objects, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Friend Function.

Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath.

RECOMMENDED BOOKS:

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusamy.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES:

After completing this, the students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: develop algorithms and flowchart for a given problem.

CO3: understand the concepts of procedural programming.

CO4: explain the concepts of object oriented programming and its significance in the real world.

CO5: analyze the problems and choose suitable programming techniques to develop solutions.

CO6: develop computer programs to solve real world problems.

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Department of Computer Science and Engineering

3290122- COMPUTER PROGRAMMING

COURSE OBJECTIVES

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To design and implement programming solutions for problem solving.

Unit I

Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The goto statement, The if statement, The if- else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

Unit V

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

RECOMMENDED BOOKS

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
- Paul Deitel and Harvey M. Deitel , How to Program, Pearson Publication.
- Yashavant Kanetkar , Let Us C, BPB publication.
- E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: describe the basic principles of procedural programming.

CO3: develop algorithms and flowchart for a given problem.

CO4: analyze the problems and choose suitable programming techniques to develop solutions.

CO5: design, implement, debug and test programs.

CO6: design computer programs to solve real world problems.

List of Experiment

Computer Programming(3290122)

1. Write a Program to Check Whether a Number is Even or Odd
2. Write a Program to Check Leap Year
3. Write a Program to find the sum of the first n natural numbers
4. Write a Program to convert string from lower case to upper case
5. Write a program to find the sum of array elements
6. Write a program to print String using Pointer
7. Write a program to swap two numbers using pointers
8. Write a Program to read the first line from a file
9. Write a Program to write a sentence on a file
10. Write a Program Binary to decimal conversion

List of Skill Based Mini-projects

Computer Programming(3290122)

1. Design a program to implement Tic tac toe game
2. Design a program to implement basic operation of Leave Management System
3. Generate a Student report card system using a C program.
4. Design a program which can generate a Calendar for any year.
5. Design a program which demonstrates the operations performed by an ATM Machine.
6. Design a program to create a Number System Conversion system.
7. Design a program to implement basic operation of Department Store Management System
8. Design a program to implement basic operation of Library Management System
9. Design a program to implement basic operation of Bus Reservation System
10. Design a program to implement Periodic Table.
11. Design a program to implement Digital clock

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

LINEAR ALGEBRA (3250100)

COURSE OBJECTIVES:

- To understand the concept of Matrices and their applications
- To understand the various aspect of algebraic structures '
- To explore vector space
- To perceive knowledge of linear transformation and their application

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Unit I

Matrix, Rank of Matrix, Echelon form, Normal form of a matrix, Solution of the simultaneous equation by elementary transformation, Consistency of equation, Eigenvalues and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem, and its application to finding the inverse of a matrix.

Unit II

Introduction of Groups and their properties, Sub-groups, Coset, Lagrange 's theorem for the finite group, Normal sub-group, Cyclic group, Ring and its properties, Field, Finite field, Integral domain, and its properties.

Unit III

Vector spaces over the field and its properties, sub-spaces, linear dependent vectors, and linearly independent vectors, a linear span of a set of vectors, basis, and dimension of a vector space, sum, and direct sum.

Unit IV

Linear transformation, Kernel and range space of linear transformation, Nullity and Rank, Singular and Non- Singular transformation, Matrix representation of a linear transformation, change of basis and similarity.

Unit V

Inner product spaces, Properties of inner product space, Norm space, Schwarz 's inequality, Triangular inequality, Parallelogram Law, Orthogonality, Generalized theorem of Pythagoras.

RECOMMENDED BOOKS:

- S. Lipschutz and M. Lipson, Linear Algebra (4th Edition), Schaum's Outline series, Mc-Graw Hill. (2009).
- S. Boyd and L. Vandenberghe, Introduction to Applied Linear Algebra Vectors, Matrices, and Least Squares, University Printing House, Cambridge CB2 8BS, United Kingdom One Liberty Plaza, 20th Floor, New York, NY 10006, USA, (2018).
- E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
- R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt. Ltd, . 5th Edition (2016).

COURSE OUTCOMES:

After completion of the course students would be able to:

CO1: Determine the solution of Matrix
CO2: Find the analytical solution of algebraic structures
CO3: Express the vector space
CO4: Acquire the knowledge of Linear transformation.
CO5: Illustrate the concept of Inner product spaces

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Basic Electrical & Electronics Engineering

3100022

Course Objectives:

- To impart the basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer and its terminology.
- To make familiarize the students about the working of rotating electrical machine, various electronic circuits and its importance.

Unit I - D.C. Circuits Analysis:

Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit II –Single-phase AC Circuits:

Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit III- Magnetic Circuits:

Basic definitions, AC excitation in magnetic circuits, self-inductance and mutual inductance, Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Flux,MMF and their relation, analysis of magnetic circuits.

Unit IV- Single-phase Transformer &Rotating Electrical Machines:

Single phase transformer, Basic concepts, construction and working principal, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.

Unit V - Digital Electronics, Devices & Circuits:

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations

Recommended Books:

1. Basic Electrical and Electronics Engineering, D.P. Kothari & I.J. Nagrath-Tata McGraw Hill
2. Basic Electrical and Electronics Engineering, V N Mittle & Arvind Mittal -Tata McGraw Hill
3. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson
4. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
5. Principles of Electrical Engineering- Vincdent Del Toro- Prentice Hall.
6. Basic Electrical Engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
7. Integrated Electronics- Millmann & Halkias
8. Electronics Devices & circuits- Sanjeev Gupta, Dhanpat Rai Publication
9. Basic Electrical and Electronics Engineering, D.C Kulshreshtha-Tata McGraw Hill

Course Outcomes

After the completion of the course, the student will be able to –

CO 1. **Solve** dc & ac circuits by applying fundamental laws & theorems
CO 2. **Compare** the behavior of electrical and magnetic circuits for given input
CO 3. **Explain** the working principle, construction, applications of rotating electrical machines
CO 4. **Explain** the working principle, constructional details, losses & applications of single phase transformer.
CO 5. **Select** the logic gates for various applications in digital electronic circuits.
CO 6. **Explain** the characteristics of the Diode and Transistor.

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Basic Electrical & Electronics Engineering Lab (3100022)

LIST OF EXPERIMENT

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine the resistance & inductance of a choke coil.
4. To determine active & reactive power in a single-phase A.C circuit.
5. To determine the voltage ratio & current ratio of a single-phase transformer.
6. To determine the polarity of a single-phase transformer.
7. To perform open circuit & short circuit tests on a single-phase transformer.
8. To study multimeters & measure various electrical quantities
9. To study of constructional details of the DC machine.
10. To determine the V-I characteristics of the diode in forward bias & reverse bias conditions.

Course Outcomes:

After the completion of the lab, the student will be able to -

CO 1. **Verify** circuit theorems.
CO 2. **Perform** tests on transformer for determination of losses, efficiency & polarity.
CO 3. **Acquire** teamwork skills for working effectively in groups
CO 4. **Prepare** an organized technical report on experiments conducted in the laboratory.

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Skill-Based Mini Project

Basic Electrical & Electronics Engineering (3100022)

1. Enlist the different electrical loads available in your home and prepare their rating chart.
2. Design the residential house wiring using fuse, switch, and indicator, lamp and energy meter. Also apply the Thevenin's theorem for finding the current in a particular branch of the circuit.
3. If one FTL (Fluorescent Tube Light) is replaced by LED bulb.
   A. Calculate the Monthly electrical energy saving?
   B. Calculate the monthly savings in electricity bill?
   Note: LUX level of FTL and LED bulbs must be the same (follow BEE Guide lines). Consider electricity bill charges from MP VidyutVitran company website.
4. What is the use of condenser in a ceiling fan? Draw a wiring diagram for the testing of motor winding.
5. Find the different ways/ Methodologies/ Guidelines, by which energy can be conserved in domestic applications?
6. Design a working model for controlling one lamp by two 2-way switch.
7. Visit the electrical machine lab and enlist different types of AC and DC motors along with their ratings. Also mention their industrial applications.
8. Visit the panel room and identify the different safety practices followed by electrical engineer.
9. Enlist different measuring instruments available in electrical workshop lab. Also prepare a comparison chart for Analog and digital measuring instruments.

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Department of Computer Science and Engineering

DIGITAL ELECTRONICS (3290123)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications, Prime Implicants, and Essential Prime Implicants definition.

Unit-III

Combinational Circuits, Half Adder, Half Subtractor, Full Adder, and Full Subtractor, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the computer architecture for defining basic component and functional unit.

CO2. recall different number system and solve the basic arithmetic operations.

CO3. develop the understanding of combinational circuits.

CO4. analyze the basic concept of sequential circuits.

CO5. compare various memories.

CO6. solve the boolean functions using logic gates.

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List of Experiments
(3290123)

1. To study and verify the truth table of various logic gates.
2. To realize Half Adder and Full Adder by using Basic logic gates
3. To realize Adder and Subtractor by using Basic logic gates
4. To design and set up 4:1 Multiplexer (MUX) using only NAND gates.
5. To design and set up 1:4 Demultiplexer (DE-MUX) using only NAND gates.
6. To realize One & Two Bit Comparator and study of 7485 magnitude comparator
7. To study and verify Truth Table of RS Flip Flop
8. To study and verify Truth Table of D type Flip Flop.
9. To study and verify Truth Table of JK type Flip Flop.
10. To study and verify Truth Table of T Flip Flop.
11. To study and verify Truth Table of JK Master Slave Flip Flop

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Skill Based Project(3290123)

- Design a 4-bit comparator
- Design a parity checker
- Design a 4-bit Ripple counter
- Design a Synchronous counter
- Design a Ring Counter
- Design a left-shift counter
- Design a right-shift counter

Please Note: Each project has to be submitted by a group of 2 to 4 students (Depending upon the project), and each group will be assigned only one project.

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Engineering Chemistry (3000002)

(Natural Sciences & Skills)

COURSE OBJECTIVES:

- Enable the students to become familiar with the concepts of Modern Engineering Chemistry Develop an understanding of complex topics in correlation to Chemical analysis and applications. So that they could be applied to engineering and applications. Help students develop an understanding of the reactions and analysis-related problems in day-to-day life/ industry/engineering field.

Unit I - Chemistry of Water Analysis

Source and impurities, alkalinity, pH, hardness of water, the interrelationship between alkalinity and hardness, degree of hardness, Standards of water for drinking purposes, Methods of water softening: lime- soda process, zeolite, and ion exchange resin process. Scale formation: causes, effects, and prevention. Caustic embitterment, priming, foaming, boiler corrosion, and deaeration. Simple numerical problems on water softening based on the lime soda process and water analysis

Unit II - Chemistry of Engineering Material

Lubricants-Introduction, functions of lubricants, types, and classification of lubricants, solid lubricants, semi-solid lubricants, liquid lubricants, synthetic lubricants, lubricating emulsions, biodegradable lubricants, mechanism of lubrication, physical & chemical properties, testing of lubricants, types of greases, application of lubricants and silicones, selection of lubricants.

Cement: introduction & raw materials, gypsum cement, Types of cement, Methods of manufacturing cement: Wet process, Dry process, Semi-dry process. Chemistry of setting & Hardening of cement, Types of Portland cement, and its derivatives.

Refractory. Introduction, classification of refractories, and properties of refractories with reference to Refractoriness, RUL, Porosity, Thermal Spalling

Unit III - Chemicals of industrial importance

Fuels- Definition & Classification of fuels and their comparison. Calorific values, Determination of calorific value by Bomb calorimeter. Proximate and ultimate analysis of coal and their significance, Varieties of fuel oils, their properties and uses, knocking, anti-knocking compounds (octane &cetane number), simple numerical problems based on fuels.

Unit IV - Polymers of Engineering importance

Introduction, types and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization and their mechanism,

Classification of plastic, important thermoplastic resins Nylon 66, Teflon, Polystyrene & important thermosetting resins Phenolic resin, Amino resin. Moulding of plastics.Natural & synthetic rubbers, Vulcanization, styrene rubber, polyurethanes, silicon rubber, reclaimed rubber, Introduction to polymer composites, Engineering Plastics, Polymer in medicine and surgery and conducting polymers

Unit V - Standard Methods of Chemical Analysis

Introduction to Chromatography- Classification of Chromatography Methods, Principle of Chromatographic Mechanisms, Terminology Used in Chromatography, Chromatographic Performance, Isolation of Separated Components (Elution), Column, Thin layer and paper Chromatography. Principle, Instrumentation and application of Gas Chromatography.

Introduction to Spectroscopy-Ultra-Violet, and Visible Spectroscopy, Theory of ultraviolet visible spectroscopy, Types of electronic transitions, Chromophore, Auxochrome, Absorption and intensity shifts, The Absorption law. Instrumentation and Applications of ultraviolet-visible spectroscopy. Introduction of IR Spectroscopy.

RECOMMENDED BOOKS:

- Engineering Chemistry- P.C.Jain and Monika Jain, Dhanpat Rai *Publishing* Co (P) Ltd, 2013
- Engineering Chemistry - B.K. Sharma, Krishna Publication, 2015
- A Text Book of Engineering Chemistry - S. S. Dara & A.K. Singh, S. Chand Publication, 2015.
- Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age Pub, 2008.
- Polymer Science – Ghosh, Tata McGraw Hill.2010
- Chemistry for Environmental Engineering - Sawyer, McCarty and Parkin – McGraw Hill, International.2003
- Industrial Chemistry - B.K. Sharma, GOEL Publishing house 2011

COURSE OUTCOMES:

After completion of the course students would be able to:

CO1: Integrate the importance of water treatment for domestic and Industrial purposes

CO2: Acquire knowledge of the types, properties, and applications of advanced Engineering materials like lubricants, fuels.

CO3: Appreciate the knowledge of the types, properties, and application of advanced polymer materials, cement, refractories.

CO4: Perform simple and complex calculations through problem-solving methods.

CO5: Summarize the concept of chromatography and spectroscopy for various engineering applications related to day to day life.

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List of Experiments

Subject Name: Engineering Chemistry laboratory
Subject code 3000002 (Under Flexible Scheme-2019-20)
B.Tech. (First / Second semester) with effect from 01.07.2022

NOTE: At least 10 of the following experiments must be performed during the session.

Experiment No.	Aim of experiment
1	Determination of Total hardness by Complexometric titration.
2	Determination of temporary and permanent hardness by Complexometric titration.
3	Determination of alkalinity of given water sample by neutralization Titration. (a) OH^- & CO_3^{2-} (b) CO_3^{2-} & $HCO3^-$
4	Determination of percentage of Fe in Iron alloy solution by redox titration.
5	Determination of percentage of Cr in Chromium alloy solution by back titration.
6	Determination of Cu in Copper alloys solution by Iodometric Titration.
7	Determination of Viscosity of given oil sample by Redwood viscometer No.1
8	Determination of Flash & fire points of given oil sample by Pensky Martin close cup Apparatus.
9	Determination of Flash & fire point of given oil sample by Cleveland's open cup Apparatus.
10	Determination of Moisture content, volatile matter content, Ash content and fixed Carbon of a given sample of coal by proximate analysis.
11	Separation of the colour pigment of spinach leaf by paper chromatography.
12	Preparation of phenol formaldehyde resin by condensation polymerization.
13	Preparation of urea formaldehyde resin by condensation polymerization.

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Course outcomes

Lab CO	After attending the lab in Engineering Chemistry (100101) the student will be able to:
CO1	Develop experimental skills required for the application of chemistry in engineering.
CO2	Operate different chemicals and instruments specified in the course safely and efficiently.
CO3	Analyze water samples, lubricants, fuel, alloys, and ores for different properties
CO4	Function as a member of a problem-solving team

Skill-Based Mini Project

Guidelines for delivering the Project:

Students will have to deliver a 10 Minute presentation preferably on PowerPoint.

1. The student can choose a topic of their choice but the same should be from the syllabi.
2. The students will have to communicate the same to the teacher in advance before delivering the same, and getting the topic approved. The teacher can change, modify, and suggest one instead.
3. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
4. Student will also have to submit a written report based on that.
5. The said activity has to be completed before the teaching ends.
6. He will be judged on basis of Presentation rubrics.

Department of Computer Science and Engineering

COMPUTER NETWORKS

910202

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

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 and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

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, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

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, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

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

CO1. Explain the fundamental concepts of computer network.
CO2. Illustrate the basic taxonomy & terminologies of computer network.
CO3. Identify various parameter for affecting the performance of computer network.
CO4. Analyze the concepts of communication using various layer of OSI model.
CO5. Evaluate the performance of computer network in congestion and Internet.
CO6. Design the network environment and applications for implementation of computer networking concept.

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Department of Computer Science and Engineering

Creative Problem Solving (Lab)

DLC-150703

Course Objectives:

- To develop a deep understanding of the principles and techniques of creative problem solving in the context of computer science engineering.
- To enhance critical thinking and analytical skills required for effectively solving complex problems.
- To foster creativity and innovation in the field of computer science engineering.
- To cultivate the ability to apply problem-solving strategies and methodologies to real-world computer science engineering challenges.
- To encourage collaborative problem solving and teamwork skills through group projects and activities.
- To explore and utilize various tools and technologies that aid in creative problem solving in computer science engineering.

UNIT-1

Definition and importance of creative problem solving in computer science engineering., Characteristics of successful problem solvers., Overview of problem-solving methodologies and techniques., Understanding the Problem

Problem identification and definition, Analysing problem constraints and requirements., Identifying relevant stakeholders and their perspectives.

Generating Ideas and Solutions: Techniques for ideation and brainstorming, Divergent and convergent thinking, Encouraging creativity and innovation in problem solving.

UNIT-2

Evaluating and Selecting Solutions: Criteria for evaluating potential solutions, Analytical decision-making techniques, considering feasibility, efficiency, and effectiveness, Implementing Solutions

Planning and organizing the implementation process: Adapting problem-solving strategies to different contexts, addressing challenges and obstacles during implementation, Collaboration and Teamwork, Effective communication and collaboration within teams, leveraging diverse skills and perspectives, managing conflicts and promoting cooperation.

UNIT-3

Tools and Technologies for Creative Problem Solving: Introduction to software tools and technologies that aid in problem-solving processes, Data analysis and visualization tools, Project management and collaboration platforms.

UNIT-4

Case Studies and Real-World Applications: Analyzing and discussing case studies from computer science engineering domains, Applying problem-solving methodologies to real-world scenario, Learning from successful problem-solving examples, Ethical Considerations in Problem Solving, Recognizing ethical implications and responsibilities in computer science engineering problem solving, Addressing social and environmental impacts, Promoting ethical decision-making.

UNIT-5

Final Project: Applying creative problem-solving skills to solve a computer science engineering problem, Collaborative project work in teams, Presentation and documentation of the project solution.

Course Outcomes:

By the end of this course, students will be able to:

CO1: Analyze complex computer science engineering problems and identify the key components and requirements.

CO2: Apply creative problem-solving techniques to generate innovative solutions for computer science engineering challenges.

CO3: Utilize critical thinking skills to evaluate and select the most effective problem-solving strategies.

CO4: Collaborate effectively in teams to brainstorm ideas, share knowledge, and solve computer science engineering problems collectively.

CO5: Communicate problem-solving methodologies and solutions clearly and effectively using appropriate technical terminology.

CO6: Adapt and apply different tools and technologies to support the creative problem-solving process in computer science engineering.