MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department

of

Computer Science and Engineering

B.Tech- CSE, CSD Programs
M.Tech- CSE Program

Agenda and Minutes
of
The BoS Meeting

BoS Meeting

Conducted on 14 December 2022.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Agenda of the BoS

(BoS Meeting Scheduled 14th December 2022)

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
Introduction to computer science & design	290121	2021	2022	30%	17	6	https://web.mitsgwalior.in/board-of-studies-bos-cse

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
Cloud Computing & Virtualization	150615	cloud computing is the delivery of computing services including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet	5	2	Annexure-2
Digital Image Processing	150616	Digital image processing is the use of a digital computer to process digital images through an algorithm	5	2	Annexure-2
Web Technologies	290401	The objective of this course is to aware students about latest web development technologies such as HTML, CSS, Java Script, PHP and MYSQL	10	3	Annexure-5B
Foundations of Cyber Physical Systems	Honours	The objective of this course is to develop an exposition of the challenges in implementing a cyber-physical system from a computational perspective, but based equally on the principles of automated control.	4	2	Annexure-1
Foundation of Cloud IoT Edge ML	900636	This course provides an in-depth understanding of terminologies and the core concepts behind Cloud-IoT-Edge problems, applications, systems and the techniques, that underlie today's cutting-edge technologies.	4	2	Annexure-1

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
Blockchain and its Applications	150663	the course provides tutorials on setting up blockchain applications using one of the well-adopted permissionless blockchain platforms - Ethereum, and one permissioned blockchain platform - Hyperledger.	2	1	Annexure -1
Data Science for Engineers	900620	Course Introduce R as a programming language and the mathematical foundations required for data science	2	1	Annexure-1

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Introduction To Internet of Things	900619	Course gives knowledge about networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions by using internet.	2	1	Annexure-1
Ethical Hacking	Honours	the course will cover various attacks and vulnerabilities and ways to secure them	4	2	Annexure-1
Python Programming	910101	This course is an introduction to programming and problem solving in Python, the course quickly builds up basic concepts such as conditionals, loops, functions, lists, strings and tuples	8	3	Annexure-2
Data Analytics with Python	150662	the course gives hands-on experience of creating analytics models& explore existing tools	7	3	Annexure-2
Cloud Computing & Virtualization	150615	cloud computing is the delivery of computing services including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet	5	2	Annexure-2
Machine Learning	150617	The Course will cover the different learning paradigms and some of the more popular	5	2	Annexure-2
Database Management System	150412/290402	the course examines data structures, file organizations, concepts and principles of DBMS's, data analysis, database design, data modeling, database management, data & query optimization, and database implementation	10	3	Annexure-5A, 5B
Software Engineering	150413/290403	The course covers life cycle model concepts, requirements specification, design, and testing issues of software development	10	3	Annexure-5A, 5B
Web Technologies	290401	The objective of this course is to aware students about latest web development technologies such as HTML, CSS, Java Script, PHP and MYSQL.	10	3	Annexure-5B

Stakeholder	Student	Faculty	Alumni	Employer
No. of responses	712	25	79	67
Link of Analysis	https://web.mitsgwalior.in/board-of-studies-bos-cse			
ATR Link	https://web.mitsgwalior.in/board-of-studies-bos-cse			
Link showing Excel sheet of Google Form details of stakeholders	https://web.mitsgwalior.in/board-of-studies-bos-cse			

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Department of Computer Science and Engineering

Date: 14/12/2022

Minutes of Meeting of Board of Studies

The Meeting of Board of Studies (BoS) in Computer Science & Engineering was held on 14 Dec 2022 **through Hybrid Mode.** During the meeting following were present.

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

In addition of this following student members were also present

1.	Mr Ashutosh Panchal	Student Member
2.	Ms Isha Awathi	Student Member
3.	Arshita Garg	Student Member
4.	Akhil Jain	Student Member

Suggestions by Members

1. Members have appreciated the overall scheme and also appreciated the concept of Novel engaging course.
2. Members suggested that in Self-study/Seminar courses the offered subjects should be increased. House has accepted and more subjects are added in the list.
3. Members also discussed that in CSD the subjects related to software design and pattern

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Department of Computer Science and Engineering

	BoS Agenda Items	
Item 1	To confirm the minutes of previous BoS meeting held in the month of May 2022 *Minutes of the last BoS held on 4 June 2022 are confirmed by the house.*	
Item 2	To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in 2019-20. (The total credits from I-VIII semester should be 170 for this batch) **The scheme for B.Tech VIII Semester, CSE discipline (under flexible curriculum) were discussed and finalized.** **The same is enclosed in** Annexure I	
Item 3	To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in *online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC4)* for credit transfer in the *VIII Semester* under the flexible curriculum (*Batch admitted in 2019-20*) **The list of Departmental Elective (DE-5 & OC-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VIII Semester, CSE discipline (under flexible curriculum) were discussed and finalized, as per the following detail.**	

Departmental Elective (DE- 5)		Weeks
Course ID: noc23_cs10	Information Security - 5 - Secure Systems Engineering	8
Course ID: noc23-cs13	Privacy and Security in Online Social Media	12
Course ID: noc23-cs47	Blockchain and its Applications	12
Course ID: noc23_cs65	Foundation of Cloud IoT Edge ML	8
Open Category (OC-4)		
Course ID: noc23-cs17	Data Science for Engineers	8
Course ID: noc23-cs51	Introduction To Internet Of Things	12
Course ID: noc23-cs05	An Introduction to Artificial Intelligence	12
Course ID: noc23-cs65	Foundation of Cloud IoT Edge ML	8

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Department of Computer Science and Engineering

Item 4	To propose the list of "Additional Courses" which can be opted for getting an

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 VI semester (for the batch admitted in 2020-21) and for VIII semester students for the batch admitted in 2019-20. The list should be additive; such that those MOOCs which were offered in previous semesters are also included provided they are being offered on the platform during Jan-June 2023 semester]

To propose the list of "Additional Courses" which can be opted for getting an
1) Honours (for students of the host department)
2) Minor Specialization (for students of other departments)
[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the VI semester (for
the batch admitted in 2020-21) and for VIII semester students (for the batch admitted in 2019-20)] The courses available on SWAYAM/NPTEL/MOOC based learning platforms for Honours and Minor Specialization were discussed and identified. The same is listed, as mentioned below

1) Courses for "Honours" VI Semester

Honours" V Semester		Weeks
Course ID: noc23_cs19	Social Networks	12
Course ID: noc23-cs13	Privacy and Security in Online Social Media	12
Course ID: noc23-cs65	Foundation of Cloud IoT Edge ML	8
Course ID: noc23_cs20	The Joy of Computing using Python	12
Course ID: noc23_cs49	Programming In Java	12
Course ID: noc23_cs50	Programming in Modern C++	12

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2) Courses for "Minor Specialization" VI Semester

Minors" V Semester		Weeks
Course ID: noc23-cs16	Design and analysis of algorithms	8
Course ID: noc23-cs29	Introduction to Database Systems	12
Course ID: noc23-cs48	Computer Networks And Internet Protocol	12
Course ID: noc23_cs15	Programming, Data Structures And Algorithms Using Python	8

Courses for "Honours"- VIII Semester

Honours" VIII Semester		Weeks
Course ID: noc23-cs44	Ethical Hacking	12
Course ID: noc23-cs65	Foundation of Cloud IoT Edge ML	8
Course ID: noc23-cs62	Foundations of Cyber Physical Systems	12
Course ID: noc23_cs20	The Joy of Computing using Python	12
Course ID: noc23_cs07	Advanced computer architecture	12
Course ID: noc23_cs42	Cloud computing	8
Course ID: noc23_cs61	GPU Architectures and Programming	12
Course ID: noc23_cs28	Introduction to parallel programming with OpenMP and MPI	8
Course ID: noc23_cs17	Data Science for Engineers	8

Courses for "Minor Specialization"- VIII semester

Minor Specialization VIII Semester		Weeks
Course ID: noc23-cs47	Blockchain and its Applications	12
Course ID: noc23-cs11	Machine Learning,ML	8
Course ID: noc23-cs65	Foundation of Cloud IoT Edge ML	8
Course ID: noc23_cs15	Programming, Data Structures And Algorithms Using Python	8
Course ID: noc23_cs42	Cloud computing	8
Course ID: noc23_cs49	Programming In Java	12
Course ID: noc23_cs44	Ethical Hacking	12
Course ID: noc23_cs48	Computer Networks And Internet Protocol	12
Course ID: noc23_cs16	Design and analysis of algorithms	8
Course ID: noc23-cs51	Introduction To Internet Of Things	12

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Item 5	To review and finalize the syllabi for all *Departmental Core (DC) Courses* of *VI Semester* (*for batches admitted in 2020-21*) under the flexible curriculum along with their Cos

Departmental Core (DC) Courses of VI Semester were discussed and finalized for Batch admitted in 2020-21. Subjects are: -

Department Core (DC subjects
150615- Cloud Computing & Virtualization
150616- Digital Image Processing
150617- Machine Learning

Scheme attached in <u>Annexure 2</u>

Syllabus with experimental list of 6 semester DC courses is attached in <u>Annexure 3</u>

Item 6	To review and finalize the courses & syllabi to be offered (*for batches admitted in 2020-21*) under **Departmental Elective (DE) Course** in the *VI Semester*

Item 7	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (*for batches admitted in 2020-21*) in online mode under *Departmental Elective (DE) Course* with credit transfer, in the *VI Semester*

The list of Departmental Elective (DE-1) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B.Tech VI Semester, CSE discipline (under flexible curriculum) were discussed and finalized, as per the following detail.

Departmental Elective (DE-1)		Weeks
Course ID: noc23-cs44	Ethical Hacking	12
Course ID: noc23-cs08	Data Analytics with Python	12
Course ID: noc23-cs47	Blockchain and its Applications	12
Course ID: noc23-cs65	Foundation of Cloud IoT Edge ML	8

Item 8	To review and finalize the courses & syllabi to be offered (*for batches admitted in 2020-21*) under the *Open Category (OC) Courses* (in traditional mode) for *VI semester* students of other departments along with their Cos

The courses to be offered under Open Category (OC) Courses for B.Tech VI Semester (for the students of other departments) under flexible curriculum were discussed and finalized for Batch admitted in 2020-21. Subjects are: -

Open Category (OC) Courses
Data Structures
Python Programming

It is further discussed that the Open Category (OC) courses are meant only for the students of other departments; therefore, the above list of courses may be kept dynamic (as per the need and demand from other departments). Syllabus (along with their COs) are attached in <u>Annexure-4</u>

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Item 8	To review and finalize the courses & syllabi to be offered *(for batches admitted in 2020-21)* under the *Open Category (OC) Courses* (in traditional mode) for *VI semester* students of other departments along with their Cos The courses to be offered under Open Category (OC) Courses for B.Tech VI Semester (for the students of other departments) under flexible curriculum were discussed and finalized for Batch admitted in 2020-21. Subjects are: - <table><tr><td>**Open Category (OC) Courses**</td></tr><tr><td>Data Structures</td></tr><tr><td>Python Programming</td></tr></table> It is further discussed that the Open Category (OC) courses are meant only for the students of other departments; therefore, the above list of courses may be kept dynamic (as per the need and demand from other departments). Syllabus (along with their COs) are attached in <u>Annexure-4</u>
Item 9	To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in VI semester *(for batches admitted in 2020-21)* <u>Annexure 3</u>
Item 10	To review and finalize the scheme and syllabi of B. Tech. *IV Semester (for batches admitted in 2021-22)* under the flexible curriculum along with their Cos The scheme for B.Tech IV Semester, CSE & CSD discipline (under flexible curriculum) were discussed and finalized. The Scheme of CSE IV semester is enclosed in <u>Annexure- 5A</u> The Scheme of CSD IV semester is enclosed in <u>Annexure- 5B</u> The Syllabus of CSE IV semester is enclosed in <u>Annexure- 5C</u> The Syllabus of CSD IV semester is enclosed in <u>Annexure- 5D</u>
Item 11	To review and finalize the Experiment list/ Lab Manual for Laboratory Courses to be offered in IV *(for batch admitted in 2021-22)* Experiment list/ Lab Manual for Laboratory Courses to be offered in IV *(for batch admitted in 2021-22)is discussed and finalized* *Same is being attached in <u>Annexure 6A</u> for CSE and <u>Annexure 6B</u> for CSD*
Item 12	To review and finalize the suggestive list of projects under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2023 semester during IV Semester *(for the batch admitted in 2021-22)*. The suggestive list of projects under the 'Skill based mini-project' category in various laboratory courses to be offered in Jan - June 2023 semester during IV Semester *(for the batch admitted in 2021-22 is discussed and finalized* *Same is being attached in <u>Annexure 7A</u> for CSE and <u>Annexure 7B</u> for CSD*

Item 13	To ratify the *Scheme & Syllabi, list of experiments and skill based mini projects of First Semester & Second Semester* B. Tech. programmes [admitted batch 2022-23 Session]
	The rectification in the *Scheme & Syllabi, list of experiments and skill based mini projects of First Semester & Second Semester* B. Tech. programmes [admitted batch 2022-23 Session] have been discussed and finalized.
	The Scheme of CSE I & II semester is enclosed in <u>Annexure- 8A</u>
	The Scheme of CSD I & II semester is enclosed in <u>Annexure- 8B</u>
	The Syllabus of CSE I semester is enclosed in <u>Annexure- 8C</u>
	The Syllabus of CSD I semester is enclosed in <u>Annexure- 8D</u>
	The Syllabus of CSE II semester is enclosed in <u>Annexure- 8E</u>
	The Syllabus of CSD II semester is enclosed in <u>Annexure- 8F</u>
Item 14	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for Jan-June 2022. Annexure-09
Item 15	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 stakeholder who have 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.}
	Curricula feedback from various stakeholders is discussed and approved. Same is being attached in :- Annexure 10 Alumni Feedback- Annexure 10(a) PTM Feedback- Annexure 11
Item 16	To review Course Outcomes (COs) feedback of various courses, its analysis and impact
	Course Outcomes (COs) feedback is discussed and approved Same is being attached in Annexure 12
Item 17	Any other matter
	Syllabus of Artificial Intelligence & Machine Learning(For Other Branches) is being discussed and finalized
	Revision of 290121 introduction of Computer Science & Design
	Same is being attached in Annexure 13

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Scheme of Examination

B.Tech. VIII Semester (Computer Science & Engineering) for batch admitted in Academic Session 2019-20

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs				L	T	P	
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam						
1.	DE	DE	Departmental Elective* (DE-5)	-	-	-	-	-	25	75	100	3	-	-	3
3.	OC	OC	Open Category* (OC-4)	-	-	-	-	-	25	75	100	2	-	-	2
4.	150811	DLC	Internship/Project (DLC-9)	-	-	-	250	150	-	-	400	-	-	6	6
5.	150802	-	Professional Development*	-	-	-	-	50	-	-	50	-	-	2	1
			Total	-	-	-	250	200	75	225	750	5	-	8	12

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

*All of these courses will run through SWAYAM/NPTEL/MOOC

*Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

DE -5*

S. No.	Subject Code	Subject Name
1.	150859	Information Security - 5 - Secure Systems Engineering
2.	150852	Privacy and Security in Online Social Media
3.	150856	Blockchain and its Applications
4.	150860	Foundation of Cloud IoT Edge ML

OC-4*

S. No.	Subject Code	Subject Name
1.	900620	Data Science for Engineers
2.	900619	Introduction To Internet Of Things
3.	900642	An Introduction to Artificial Intelligence
4.	900636	Foundation of Cloud IoT Edge ML

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

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

Honours* (to be opted by students of Parent Department)	Minor Specialization* (to be opted by students of Other Department)
Foundations of Cyber Physical Systems	Blockchain and its Applications
Foundation of Cloud IoT Edge ML	Machine Learning,ML
Ethical Hacking	Foundation of Cloud IoT Edge ML
The Joy of Computing Using Python	Programming Data Structures And Algorithms Using Python
Advanced Computer Architecture	Cloud Computing
Cloud Computing	Programming in Java
GPU architectures and Programing	Ethical Hacking
Introduction to parallel programming with Open MP and MPI	Computer Networks and Internet Protocol
Data Science for Engineers	Design and analysis of algorithms
	Introduction To Internet Of Things

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

Department of Computer Science & Engineering

Scheme of Evaluation

B. Tech. VI Semester (Computer Science and Engineering) for admitted batch 2020-21

S. No.	Subject Code	Category Code	Subject Name	Theory Slot — End Term Evaluation: End Sem. Exam.	Proficiency in subject/course	Continuous Evaluation: Mid Sem. Exam.	Quiz/Assignment	Practical Slot — End Sem. Exam.	Continuous Evaluation: Lab work & professional	Skill Based Mini Project	MOOCs Assignment	MOOCs Exam	Total Marks	L	T	P	Total Credits	Mode of Teaching (Online, Offline, Blended)	Mode of Exam.
1.	150615	DC	Cloud Computing & Virtualization	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Offline	PP
2.	150616	DC	Digital Image Processing	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Offline	PP
3.	150617	DC	Machine Learning	50	10	20	20	60	20	20	-	-	200	3	-	2	4	Offline	PP
4.	DE	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ
5.	OC	OC	Open Category (OC-1)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Offline	PP
6.	150618	DLC	Minor Project-II	-	-	-	-	60	40	-	-	-	100	-	-	4	2	Offline	SO
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO
			Total	200	40	80	80	290	100	60	25	75	950	15	-	12	21	-	-
8.	1000007	MAC	Intellectual Property Rights (IPR)	50	10	20	20	-	-	-	-	-	100	2	-	-	GRADE	Online	MCQ

Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester

Additional Course for Honours or minor Specialization	Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization

*proficiency in course/subject-includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.

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

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform with credit transfer

	Mode of Teaching						Mode of Examination					
	Theory		Blended		Lab		NEC	Theory			Lab	NEC	Total Credits
	Online	Offline	Offline	Online	Offline	Online	Interactive	PP	A+O	MCQ	SO	SO	
	3	12	-	-	5	-	1	15	-	3	2	1	21
	14.28	57.14			23.8		4.76	71.42	-	14.28	9.52	4.76	

OC-1: 1) 910100- Data Structures 2) 910101- Python Programming

DE-1: 1) 150661- Ethical Hacking 2) 150662- Data Analytics with Python 3) 150663- Blockchain and its Applications 4) 150664 Foundation of Cloud IOT Edge ML.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Syllabus with experimental list

6th semester

Annexure 3

CLOUD COMPUTING AND VIRTUALIZATION
DC- 150615

Course Objectives:

1. To Provide the basics of cloud computing concepts along with virtualization techniques.

2. To provide overview of the field of Cloud Computing, and an in-depth study into its enabling technologies and main building blocks.

3. To develop the skills needed to become a practitioner or carry out research projects in this domain.

Unit I - Introduction:

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

Unit II – Virtualization Concepts:

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

Unit III – Cloud Architecture:

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

Unit IV – Cloud Storage & Security:

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

Unit V – Tools and Techniques:

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

COURSE OUTCOMES:

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

1. Build the fundamental ideas behind Cloud Computing, the evolution of the paradigm, and introduce the virtualization concepts.
2. Understand ideas and principles of Virtualization and its applications.
3. Describe fundamental concepts of cloud infrastructures and Service Oriented Architecture.
4. Illustrate the fundamental concepts of cloud storage and cloud security.
5. Study of various tools and technologies for implementing applications of Cloud.

Reference Books:-

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

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

List of Experiments for Cloud Computing And Virtualization

1. Study of Cloud Service Models
2. Working with Goggle Drive to make spreadsheet and notes
3. Installation and configuration of Hadoop
4. Installation and configuration of Justcloud
5. Working and installation of CloudSim
6. Working and installation of GreenCloud
7. Working and installation of VMWare
8. Working and installation of Oracle Virtual Box
9. Working and installation of Google App Engine
10. Working and installation of Microsoft Azure
11. Study of Amazon Web Services

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

List of Skill Based Mini Projects for Cloud Computing and Virtualization

1. Cloud-Enabled Attendance System
2. Cloud-Enabled Bookstore System
3. Online Blood Bank System
4. Cloud-Based Bus Pass System
5. Online Education System
6. Cloud-Enabled Data Leak Detection System Using SQL Injection
7. Online Chatbot System
8. Cloud-Based File Storage System using Hybrid Cryptography
9. Cloud-Based Rural Banking
10. Cloud-Based Smart Traffic Management System

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIGITAL IMAGE PROCESSING
DC-150616

COURSE OBJECTIVES:
1. To understand the fundamentals of image acquisition, image processing in spatial and frequency domain.
2. To understand image transforms used in digital image processing.
3. To know about the image restoration techniques and methods used in image processing.

Unit – I:

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

Unit – II:

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

Unit – III:

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

Unit – IV:

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

Unit –V:

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

RECOMMENDED BOOKS:

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

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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

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

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

CO3: Apply image processing techniques to enhance visual images

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

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

CO6: Design a system using the mathematical models and principles of digital image processing for real world problems.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LIST OF EXPERIMENT

1. Program to read an image and display it on the screen.

2. Program to determine image negative.

3. Read an image and perform different filtering operations (Average, Median etc.)

4. Program to create motion blur.

5. Program performs gray level slicing without background.

6. Program to perform brightness enhancement and brightness suppression of an image.

7. To create a vision program to find histogram value and display histograph of a grayscale and color image.

8. Read an RGB image and segment it using threshold method.

9. Read a colour image and separate the colour image into red green and blue planes.

10. Perform gamma correction for the given colour image

11. Program to perform different image conversion techniques

12. To create a color image and perform read and write operation

13. Code to implement watermarking in spatial domain.

14. Code to generate different levels of Gaussian Pyramid.

Skill Based Mini Project

1. Read multiple images from a folder and show them using sub plotting operation.
2. Read an image given by the user and perform different filtering operations (Average, Median etc.)
3. Implement Smart selfie using image processing techniques.
4. Object detection (eg. Face mask, Number plate etc.)
5. Bookshop management system using Image processing techniques
6. Real time sentiment analysis.
7. Apply image segmentation techniques on original image given by the user.
8. Implement a GUI to enhance the image using Histogram equalization techniques.
9. Implement a GUI for Edge detection (Sobel, Prewitt, Canny etc.)

MACHINE LEARNING
150617

COURSE OBJECTIVES:
1. To understand types of issues and challenges that could be solved by machine learning.
2. To be able to understand wide variety of learning models and use them.
3. To be able to evaluate and optimize these models

Unit – I:

Introduction to Machine Learning: Learning, Traditional Vs Machine Learning, Types Of ML, Classification and Regression model, Challenges faced by ML, Steps of developing an ML model, Bias and Variance, Underfitting and Overfitting, Regularization, Data visualization, Outlier, Testing and validating, K cross validation, Hyperparameter tuning, Model Selection.

Unit – II:

Model optimization and Evaluation: Parametric and non- Parametric model, Learner performance evaluation, confusion matrix, Recall, accuracy, precision, Model optimization, Cost/Loss Function, Derivative of cost function and non-derivative cost function, Gradient descent, Mini-batch Gradient Descent (sckit-learn), Stochastic Gradient descent(sckit-learn), Momentum(sckit-learn).

Unit – III:

Supervised Machine Learning Algorithim with python: Model Complexity vs Dataset Size, Supervised Machine Learning Algorithms, k-Nearest Neighbors, Linear Regression, RMSE, Logistic Regression, Log Loss, Support Vector Machine, Hinge Loss, Kernel Trick, polynomial Kernal, Decision Trees, Gini impurity.

Unit – IV:
Ensemble Learner with python: Ensemble learner, Bagging, Pasting , Voting Classifiers, Out-of-Bag, Evaluation, Random Patches and Random Subspaces , Random Forests , Extra-Trees, Boosting , AdaBoost, Gradient Boosting, Stacking.

Unit –V:

Unsupervised Machine Learning with python: The Curse of Dimensionality, Projection, Manifold Learning Principal component analysis, Clustering , K-Means, Limits of K-Means, Clustering for Image Segmentation, Clustering for Preprocessing, Clustering for Semi-Supervised Learning, DBSCAN.

RECOMMENDED BOOKS:
1. Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow by Aurélien Géron
2. Introduction to Machine Learning with Python by Andreas C. Müller & Sarah Guido, O'reilly
3. Machine Learning For Absolute Beginners: A Plain English Introduction (Second Edition)" by Oliver Theobald
4. Machine Learning For Dummies" by John Paul Mueller and Luca Massaron
5. Machine Learning in Action" by Peter Harrington

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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

CO1: Define basic concepts of Machine Learning.

CO2: Illustrate various techniques for learner evaluation and optimization using python

CO3: Implement various types of supervised machine learning algorithm using python

CO4: Apply ML ensemble model to solve real world problem using python

CO5: Apply unsupervised ML techniques to solve real world problems using python

LIST OF EXPERIMENT

1. Perform exploratory data analysis and visualization after importing a .CSV file.
   - Handle missing data by detecting and dropping/ filling missing values.
   - Transform data using different methods.
   - Detect and filter outliers.
   - Perform Vectorized String operations on Pandas Series.
   - Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

2. Recognize data Skew-ness, outliers both using statistical function and Graphical representation.

3. Write a Python program to implement Simple Linear Regression to predict if male or female based on Height.

4. Implement Various Regression algorithm for House Price Prediction (USA housing Dataset) and compare there accuracy using scikitlearn
   - Linear Regression
   - Polynomial Regression
   - Support Vector machine

5. Implement Logistic regressor using softmax on iris dataset using sckitlearn.

6. Implement Regularized Regression for house price prediction and evaluate there accuracy using sckitlearn.
   - Ridge Regression
   - Lasso Regression

7. Implement Various Classification algorithm for iris data set and evaluate there performance.
   - Navie Bayes Classifier
   - Logistic Regression
   - Support vector Machine
   - Decision tree

8. Implement Various ensemble on housing and iris dataset and evaluate there performance
   - Voting classifier
   - Random Forest (Bagging and pasting)

9. Implement principle component analysis on any choosen dataset/

10. Implement various clustering algorithm on choosen dataset
    1. K-Mean
    2. DBSCAN

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Skill Based Mini Project

1. Implement a regressor for any Medical disease diagnosis.

2. Implement a Cervical Cancer Risk Classifier

3. Regression model for Video Game Sales Prediction
4. Regression model for predicting if song will be popular

5. Regression model for Customer Behavior Analysis

6. Regression model to predict health insurance cost

7. Titanic Survival Prediction

8. Spam and not Spam Classifier

9. Spotify Music Recommendation System

10. Target Customer segmentation.

Syllabus OC Courses

6th semester

Annexure 4

Department of Computer Science and Engineering

DATA STRUCTURES
910100 (OC-1)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their Characteristics, Asymptotic Notations. Arrays and its Representations, Index to Address Translation. **Linked List:** Introduction, Implementation of Linked List, Operations, Circular Linked List, Doubly Linked List, Polynomial Manipulation using Linked List.

Unit-II

Stacks: Concepts and Implementation of Stacks, Operations on Stack, Conversion of Infix to Postfix Notation, Evaluation of Postfix Expression, Recursion.
Queues: Concepts and Implementation, Operations on Queues, Dequeue, Priority Queues, Circular Queues and Application.

Unit-III

Trees: Types, Terminology, Binary Tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary Search Tree, Threaded Binary Tree and Height Balanced Tree.

Unit-IV

Graphs: Background, Graph Theory Terminologies, Representation of Graphs-Sequential & Linked Representation, Path Matrix, Graph Traversals- BFS, DFS, Spanning Trees, Applications of Graph.

Unit-V

Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort and Heap Sort, Comparison between Sorting Techniques, Hashing and Collision Resolution Techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

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

CO1. outline the basics of algorithms and their performance criteria.

CO2. explain the working of linear/non-linear data structures.

CO3. identify the appropriate data structure to solve specific problems.

CO4. analyze the performance of various data structures & their applications.

CO5. evaluate the time/space complexities of various data structures & their applications.

CO6. design the optimal algorithmic solutions for various problems.

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Department of Computer Science and Engineering

PYTHON PROGRAMMING
910101 (OC-1)

COURSE OBJECTIVES

- To understand the structure and components of a python program.
- To learn the basic construct of python programming for implementing interdisciplinary research-based problems.
- To plot data using appropriate python visualization libraries for analysis.

Unit I

Introduction to Python: Setting Up Programming Environment, Running Python Programs from a Terminal, Variables and Simple Data Types: Variables, Strings, Numbers and Maths, Comments, Conditional Statements, Introducing Loops, Working of Input Function.

Unit II

Tuples and Lists: Tuples, Lists, List Operations, Using If Statements with Lists, Organizing a List, Working with Lists: Looping through Entire List, Making Numeric Lists, Working with Part of List. Dictionaries and Sets: Simple Dictionary, Looping Through a Dictionary, Nesting, Example with a Dictionary, Fibonacci and Dictionaries, Global Variables, Defining a Set, Set Operations.

Unit III

Functions: Defining a Function, Passing Arguments, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in Module, In- Built Functions, Lambda Functions. **Classes and Inheritance:** Object Oriented Programming, Creating and using a Class, Working with Class Instances, Methods, Inheritance, Importing Classes, Python Standard Library.

Unit IV

Files and Exceptions: Reading from a File, Writing to a File, File Operations, Assertions, Exceptions, Exception example. **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Data Visualization: Installing Matplotlib, Plotting a Simple Line Graph, Random Walks, Making Histogram. **Graphical User Interfaces:** Event-Driven Programming Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colors, Layouts, Nested Frames.

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
- Learn Python the Hard Way: 3rd Edition.
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

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

CO1. understand basic python programming constructs

CO2. analyze various data structures available in python

CO3. implement the Object-oriented programming paradigm in Python

CO4. apply the different File handling operations

CO5. design GUI Applications in Python

CO6. construct graphical representation of data using python packages

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Scheme of

B.Tech IV Semester

For batch admitted 2021-22

(Computer Science & Engineering)

Under Flexible Curriculum

[Item-10]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

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

S.No.	Subject Code	Subject Name	Category Code	Maximum Marks Allotted — Theory Slot — End Term Evaluation — End Term Evaluation	Proficiency in subject /course	Continuous Evaluation — Mid Sem. Exam.	Continuous Evaluation — Quiz/ Assignment	Practical Slot — End Sem.	Continuous Evaluation — Lab Work & Sessional	Continuous Evaluation — Skill based mini project	Total Marks	Contact Hours per week — L	T	P	Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam
1.	150411	Computer Networks	DC	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
2.	150412	Database Management System	DC	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	150413	Software Engineering	DC	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	MCQ
4.	150414	Theory of Computation	DC	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	150415	Programming Lab Python Programming	DLC	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
6.	150416	Discrete Structures	DC	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
7.	2000XXX	Novel engaging courses	CLC	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
		Total		250	50	100	100	230	60	60	850	13	2	10	20		
8.	1000001	Indian Constitution and Traditional Knowledge(Mandatory Audit Course) SS	MAC	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

MCQ: Multiple Choice Question   AO: Assignment + Oral   OB: Open Book   PP: Pen Paper   SO: Submission & Oral   CLC:College level course

*Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance ,one minute paper writing, etc. in that particular course/subject,SS Course will run for Group A/B in III/IV semester respectively.

	Mode of Teaching				
	Theory			Lab	
	Online	Blended		NEC	
	Online	Offline	Online	Interactive	Offline
Offline	-	10	5	1	4
-	-	50	25	5	20

	Mode of Examination				
	Theory			Lab	
	NEC				
	Interactive	PP	A+O	MCQ	SO
	1	14	-	3	2
	5	70	-	15	10

	Total Credits		
	SIP/ SLP/ NEC		
	SO		
	1		
	5	Credits %	20

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Scheme of

B.Tech IV Semester

For batch admitted 2021-22

(Computer Science & Design)

Under Flexible Curriculum

[Item-10]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. IV Semester (Computer Science and Design)

S. No.	Subject Code	Category Code	Subject Name	Theory Slot — End Term Evaluation	Theory Slot — Proficiency in subject/course	Theory Slot — Mid Sem. Exam.	Theory Slot — Quiz/Assignment	Practical Slot — End Sem.	Practical Slot — Lab Work & Sessional	Practical Slot — Skill based mini project	Total Marks	L	T	P	Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam
1.	290401	DC	Web Technologies	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
2.	290402	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	290403	DC	Software Engineering	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	MCQ
4.	290404	DC	Theory of Computation	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
6.	290405	DC	Computer Networks	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
5.	290406	DLC	Programming Lab Python Programming	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
7.	2000XXX	CLC	Novel engaging courses	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
			Total	250	50	100	100	230	60	60	850	13	2	10	20		
8.	1000001	MAC	Indian Constitution and Traditional Knowledge(Mandatory Audit Course) SS	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

MCQ: Multiple Choice Question   AO: Assignment + Oral   OB: Open Book   PP: Pen Paper   SO: Submission & Oral   CLC: College level course

Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance ,one minute paper writing etc. in that particular course/subject.SS Course will run for Group A/B in III/IV semester respectively.

Mode of Teaching

Theory — Online	Theory — Blended (Offline)	Theory — Blended (Online)	Lab — Offline	NEC — Interactive
-	10	5	4	1
-	50	25	20	5

Mode of Examination

Theory — PP	Theory — A+O	NEC — Interactive	Lab — MCQ	Lab — SO	SIP/ SLP/ NEC — SO	Total Credits
14	-	1	3	2	1	20
70	-	5	15	10	5	Credits %

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Syllabi of
Departmental Courses (DC) Courses
B.Tech IV Semester
(Computer Science and Engineering)
Under Flexible Curriculum
Annexure- 5C

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Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

COURSE OBJECTIVES

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

Unit-I

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

Unit-II

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

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD,CSMA/CA,IEEE 802.3 frame format.

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Unit-IV

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

Unit-V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

Aftercompletionofthecoursestudentswould beable to:

CO1. Outline the Data Communications System and its components.
CO2. Identify the different types of network topologies and protocols.
CO3. Enumerate the layers of the OSI model and function(s) of each layer.
CO4. Identify the different types of network devices and their functions within a network
CO5. Analyze the problems associated with various networking protocols and measure the Performance
CO6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
150412 (DC)

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,

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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

Aftercompletionofthecoursestudentswould beable to:

CO1. Define the terminology, features, classifications, and characteristics embodied indatabase 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 queryProblems.

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Department of Computer Science and Engineering

SOFTWARE ENGINEERING
150413 (DC)

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

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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
Aftercompletionofthecoursestudentswould beable 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
THEORY OF COMPUTATION
150414 (DC)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and Mealy machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem (PCB).

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RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

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

CO1. Explain the basic concepts of switching and finite automata theory & languages.

CO2. Relate practical problems to languages, automata, computability and complexity.

CO3. Construct abstract models of computing and check their power to recognize the languages.

CO4. Analyse the grammar, its types, simplification and normal form.

CO5. Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. Develop an overview of how automata theory, languages and computation are applicable in engineering application.

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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

COURSE OBJECTIVES
- To understand components of Python Program
- To learn the basic construct of python programming for solving real world research-based problems.
- To visualize and analyze data using python libraries

Unit 1:

Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements.

Unit 2:

Introducing loops, working of input function, various operations on Tuples, lists, Set and Dictionary, Loops, Conditional Statement,

Unit 3:

Built in function, defining a function, passing arguments, return value, lambda function, exception handling

Unit 4:

Object oriented programming, Creating and using class and object, methods, inheritance, debugging.

Unit 5:

Working with packages, pandas, NumPy, Matplotlib and scikit-learn

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RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
- Learn Python the Hard Way: 3rd Edition
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

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

CO1. Tell the use of various built-in data structures used in python.

CO2. Outline the working of file handling operations, normal functions and lambda functions in python.

CO3. Apply the concepts of object oriented programming in python.

CO4. Analyze the data and visualize it using python's matplotlib.

CO5. Rule out various important characteristics of data using scikit-learn package.

CO6. Create efficient algorithms in python to solve real world problems.

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Department of Computer Science and Engineering

DISCRETE STRUCTURES

150416

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.

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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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Syllabi of
Departmental Courses (DC) Courses
B.Tech IV Semester
(Computer Science and Design)
Under Flexible Curriculum
Annexure- 5D

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Department of Computer Science and Engineering

Web Technologies

290401

COURSE OBJECTIVES

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

Unit – I:

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

Unit – II:

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

Unit – III:

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

Unit – IV:

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

Unit – V:

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

RECOMMENDED BOOKS

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RECOMMENDED BOOKS

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India

2. Web Technologies, Black Book, dreamtech Press

3. Web Technologies, Achyut Godbole, Atul Kahate, Tata McGraw-Hill

4. Principles of Web Design, Joel Sklar, Cengage Learning

COURSE OUTCOMES

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

CO1: Utilize the set of standards, protocols, and interfaces required to deliver information reliably over the Internet.

CO2: Identify suitable web designing technologies for website development

CO3: Design basic webpages using HTML and CSS

CO4: Validate user input using JavaScript

CO5: Design Static and Dynamic website

Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
290402 (DC)

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.

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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
290403 (DC)

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

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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
THEORY OF COMPUTATION
290404 (DC)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and Mealy machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem (PCB).

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RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft& Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis &Christors,Pearson.
- Theory of Computation, Chandrasekhar &Mishra,PHI.
- Theory of Computation, Wood, Harper &Row.
- Introduction to Computing Theory, Daniel I-A Cohen,Wiley.

COURSE OUTCOMES

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

CO1. Explain the basic concepts of switching and finite automata theory & languages.

CO2. Relate practical problems to languages, automata, computability and complexity.

CO3. Construct abstract models of computing and check their power to recognize the languages.

CO4. Analyse the grammar, its types, simplification and normal form.

CO5. Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. Develop an overview of how automata theory, languages and computation are applicable in engineering application.

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Department of Computer Science and Engineering

COMPUTER NETWORKS
290405 (DC)

COURSE OBJECTIVES

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

Unit-I

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

Unit-II

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

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD,CSMA/CA,IEEE 802.3 frame format.

Unit-IV

Network Layer& Transport Layer: Introduction, Design issues,Services,Routing- Distance vector routing, Hierarchical routing , Link state routing, Shortest path algorithm- Dijkstra's Algorithm&Floyd–Warshall's Algorithm, Flooding, Congestion

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Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, Port addressing basics.

Unit-V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. Outline the Data Communications System and its components.

CO2. Identify the different types of network topologies and protocols.

CO3. Enumerate the layers of the OSI model and function(s) of each layer.

CO4. Identify the different types of network devices and their functions within a network

CO5.Analyze the problems associated with various networking protocols and measure the Performance

CO6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

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Department of Computer Science and Engineering

PROGRAMMING LAB.
290406(DLC)
Python Programming

COURSE OBJECTIVES
- To understand components of Python Program
- To learn the basic construct of python programming for solving real world research-based problems.
- To visualize and analyze data using python libraries

Unit 1:

Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements.

Unit 2:

Introducing loops, working of input function, various operations on Tuples, lists, Set and Dictionary, Loops, Conditional Statement,

Unit 3:
Built in function, defining a function, passing arguments, return value, lambda function, exception handling

Unit 4:
Object oriented programming, Creating and using class and object, methods, inheritance, debugging.

Unit 5:
Working with packages, pandas, NumPy, Matplotlib and scikit-learn

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
- Learn Python the Hard Way: 3rd Edition

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- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

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

CO1. Tell the use of various built-in data structures used in python.
CO2. Outline the working of file handling operations, normal functions and lambda functions in python.
CO3. Apply the concepts of object oriented programming in python.
CO4. Analyze the data and visualize it using python's matplotlib.
CO5. Rule out various important characteristics of data using scikit-learn package.
CO6. Create efficient algorithms in python to solve real world problems.

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Experiment list/ Lab manual for Laboratory Courses
B.Tech IV Semester
For batch admitted 2020-21
(Computer Science and Engineering)
Annexure-6A

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Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

List of Experiments

1) Study of different types of network cables and practically implement cross wired cable and straight through cable using clamping tool.

2) Install and configure Network Devices: HUB, Switch and Routers.

3) Configure Internet connection and use Ipconfig, tracert, ping, arp and Netstat utilities to debug the network issues.

4) Configure a Network topology using simulation software.

5) Simulation and analysis of Error and Flow Control protocols.

6) Simulation & Analysis of Routing Protocols.

7) Network Traffic flow analysis using Wireshark utility.

8) Installation and working of web proxy software's(CCproxy).

9) Datatransfer between two systems using Socket programming

10) Simulate stop and wait protocol using Socket programming.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
150412 (DC)

List of Experiment

1. Implementation of DDL commands of SQL with suitable examples
   1. Create table
   2. Alter table
   3. Drop table
2. Implementation of DML commands of SQL with suitable examples
   1. Insert
   2. Update
   3. Delete
3. Implementation of different types of function with suitable examples
   1. Number function
   2. Aggregate function
   3. Character function
   4. Conversion function
   5. Date function
4. Implementation of different types of operators in SQL
   1. Arithmetic operators
   2. Logical operators
   3. Comparison operators
   4. Set operation
5. Implementation of different types of joins
   1. Inner join
   2. Outer join
   3. Natural join
6. Study and implementation of
   1. Group by and having clause
   2. Order by clause
   3. Indexing
7. Study and implementation of
   1. Sub queries
   2. Views
8. Study and implementation of different types of constraints.
9. Study and implementation of Database Backup and Recovery commands.
10. Study and implementation of Rollback, Commit, Savepoint.

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Department of Computer Science and Engineering

PROGRAMMING LAB (Python Programming)

150415(DLC)

List of Experiment

1. Write program totake input from user and display "Display Text".
2. Write program to do arithmetic operations.
3. Write program to find area of rectangle, circle and triangle.
4. Write program to check number is even or odd, prime not prime.
5. Write program find factorial of a number.
6. Write program to check year is leap year or not.
7. Write Program to implement the operation on List, Tuple, Set and Dictionary.
8. Write Program to handle the exception and file handling operation.
9. Write Program to create and use of user defined function.
10. Write Program to solve a problem using Lambda function
11. Write Program for creating an object with and without inheritance.

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Experiment list/ Lab manual for Laboratory Courses
B.Tech IV Semester
For batch admitted 2020-21
(Computer Science and Design)
Annexure-6B

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Department of Computer Science and Engineering

290401 (DC)

Web Technology

1. Write HTML program to learn various tags.
2. Write HTML program to change color and style of the content.
3. Write HTML program to open the MITS college web page using links.
4. Write HTML program to demonstrate list.
5. Write HTML program to demonstrate table.
6. Write HTML program to demonstrate forms.
7. Write HTML program to insert image.
8. Create a webpage with HTML describing your department use paragraph , lists tags and images.
9. Write programs to learn inline, internal and external CSS.
10. Write CSS programs to understand various selectors.
11. Write CSS programs to demonstrate padding properties
12. Write CSS programs to insert image using box Model.
13. Write javascript program to print "Hello World."
14. Exploring if-else in javascript.
15. Exploring switch-case in javascript.
16. Create javascript programs with for loop, while and do-while loops
17. Arrays and Strings in Javascript.
18. Functions in Javascript
19. Write javascript program that changes HTML content.
20. Write javascript program that changes HTML attributes.
21. Write javascipt program to change the style of HTML elements.
22. Write javascript program to hide the HTML elements.
23. Write javascript program to show hidden HTML elements
24. Write program to demonstrate data types operators and print statement using PHP.
25. Exploring if-else, switch-case in PHP.
26. Exploring switch-case in PHP.
27. Create PHP programs with for loop, while and do-while loops
28. Array and String in PHP.
29. Functions in PHP.
30. Learn simple query using select and where clause.
31. Learn simple query using order by, min, max, count, avg, sum, like, alias, in keywords.
32. Learn to create website using menu icon, and tabs, navigations, search bar.
33. Learn to create website using navigations and search bar.

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
290402 (DC)

List of Experiment

1. Implementation of DDL commands of SQL with suitable examples
    1. Create table
    2. Alter table
    3. Drop table
2. Implementation of DML commands of SQL with suitable examples
    1. Insert
    2. Update
    3. Delete
3. Implementation of different types of function with suitable examples
    1. Number function
    2. Aggregate function
    3. Character function
    4. Conversion function
    5. Date function
4. Implementation of different types of operators in SQL
    1. Arithmetic operators
    2. Logical operators
    3. Comparison operators
    4. Set operation
5. Implementation of different types of joins
    1. Inner join
    2. Outer join
    3. Natural join
6. Study and implementation of
    1. Group by and having clause
    2. Order by clause
    3. Indexing
7. Study and implementation of
    1. Sub queries
    2. Views
8. Study and implementation of different types of constraints.
9. Study and implementation of Database Backup and Recovery commands.
10. Study and implementation of Rollback, Commit, Savepoint.

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Department of Computer Science and Engineering

PROGRAMMING LAB (Python Programming)

290406(DLC)

List of Experiment

----

1. Write program totake input from user and display "Display Text".
2. Write program to do arithmetic operations.
3. Write program to find area of rectangle, circle and triangle.
4. Write program to check number is even or odd, prime not prime.
5. Write program find factorial of a number.
6. Write program to check year is leap year or not.
7. Write Program to implement the operation on List, Tuple, Set and Dictionary.
8. Write Program to handle the exception and file handling operation.
9. Write Program to create and use of user defined function.
10. Write Program to solve a problem using Lambda function
11. Write Program for creating an object with and without inheritance.

Skill Based Mini Projects
B.Tech IV Semester
For batch admitted 2020-21
(Computer Science and Engineering)
<u>Annexure-7A</u>

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Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

List of Skill Based Project

1) Design and demonstrate the operation of the Ethernet network to examine the performance of the Ethernet network under different scenario using the NET Simulator.

2) Design and demonstrate the implementation of a token ring network to examine the performance of the token ring network under different scenarios with the use of Net Simulator.

3) Design and demonstrate the basics of designing a network, taking into consideration the users, services, and locations of the hosts.

4) Configure and analyze the performance of the Open ShortestPath First (OSPF) routing protocol with the use of NET Simulator.

5) Designand demonstrate the congestion control algorithms implemented by theTransmission Control Protocol (TCP).

6) Examine the effect of different queuing disciplines on packet delivery and delay for different services using the NET Simulator.

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DATABASE MANAGEMENT SYSTEM
150412 (DC)
List of Skill Based 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 .

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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

List of Program

1. Visualize the Publically available real world data set using various function and identify the suitable plot for better representation.
2. Handle the missing data and categorical value in a real world Data Set.
3. Build a prediction model based on Classification Data Set
4. Build a prediction model based on Regression Data Set
5. Build a prediction model based on Clustering Data Set

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Skill Based Mini Projects
B.Tech IV Semester
For batch admitted 2020-21
(Computer Science andDesign)
Annexure-7B

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Department of Computer Science and Engineering

Web Technology
290401 (DC)

List of Skill Based Project

1) Create a website for Conference
2) Create a website for Music Portfolio
3) Create a website for Photography Site
4) Create a website for Personal Portfolio
5) Create a website for Technical Documentation
6) Create a website containing all information for a person you admire.
7) Create a website for auction purpose
8) Create a e-commerce website
9) Create a website for books lover.
10) Create a website for online food delivery system

Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
290402 (DC)
List of Skill Based 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 .

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Department of Computer Science and Engineering

PROGRAMMING LAB.
290406(DLC)
Python Programming

List of Skill Based Project

----

1. Visualize the Publically available real world data set using various function and identify the suitable plot for better representation.

2. Handle the missing data and categorical value in a real world Data Set.

3. Build a prediction model based on Classification Data Set

4. Build a prediction model based on Regression Data Set

5. Build a prediction model based on Clustering Data Set

Annexure-B4

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 2022-2_)

S. No.	Subject Code	Category Code	Subject Name	Theory Slot – End Term Evaluation – End Sem. Exam	Theory Slot – End Term Evaluation – ^{S}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.	2150121	DC	Digital Electronics	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	2150122	DC	Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended	AO	2 Hrs
3.	2150123	DC	Emerging Technologies in Computer Science	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
4.	2100011	BSC	Engineering Mathematics-I	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
5.	2100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
6.	2150124	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO	-
			Total	250	50	100	100	180	60	60	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.

^{S}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

AO: Assignment + Oral   OB: Open Book   PP: Pen Paper   SO: Submission + Oral

MCQ: Multiple Choice Question

Mode of Teaching

	Theory – Offline	Theory – Blended – Offline	Theory – Blended – Online	Lab – Offline	Lab – Blended – Offline	Lab – Blended – Online	Total Credits
	4	8	4	3	4	4	19
	21	42	21	16	21	21	5

Mode of Examination

	Theory – PP	Theory – AO	Theory – MCQ	Lab – Offline	Lab – MCQ	Lab – SO	Total Credits
	10	4	4	3	4	1	19
	53	21	21	16	21	5	

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Department of Computer Science and Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 22-23)

S. No.	Subject Code	Category Code	Subject Name	Theory Slot — End Term Evaluation: End Sem. Exam	Theory Slot — End Term Evaluation: $Proficiency In subject /course	Theory Slot — Continuous Evaluation: Mid Sem. Exam.	Theory Slot — Continuous Evaluation: Quiz/Assignment	Practical Slot — End Sem. Exam	Practical Slot — Continuous Evaluation: Lab Work & Sessional	Practical Slot — Continuous Evaluation: Skill Based Mini Project	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Teaching	Mode of Exam.
1.	2150221	DC	Data Structures	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP
2.	2150222	DC	Python Programming	50	10	20	20	60	20	20	200	3	-	2	4	Blended	AO
3.	2150223	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP
4.	2150224	DC	Computer Graphics	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP
5.	2100025	BSC	Engineering Mathematics –II	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP
6.	2150225	DLC	Hardware and Troubleshooting Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
			Total	250	50	100	100	240	80	80	900	13	02	08	19		
7.	3000001	Natural Sciences & Skills	Engineering Physics	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ

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

Theory					Lab			Total Credits
Offline	Online	Blended			Offline	Online		
		Offline	Online					
3	-	8	4		4	4		19
16		42	21		21	21		19

Mode of Examination

Theory			Lab		Total Credits
PP	AO	MCQ	SO	MCQ	
14	4	-	1	-	19
74	21		5		19

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR — Annexure-8B

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

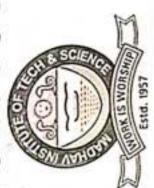## Department of Computer Science and Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 2022-2...)

S. No.	Subject Code	Category Code	Subject Name	Theory Slot — End Term Evaluation: End Sem. Exam	Proficiency in subject/course	Continuous Evaluation: Mid Sem. Exam.	Quiz/Assignment	Practical Slot: End Sem. Exam	Continuous Evaluation: Lab Work & Sessional	Skill Based Mini Project	Total Marks	L	T	P	Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
1.	2290121	DC	Introduction to Computer Science and Design	50	10	20	20	-	-	-	100	3	-	-	3	Blended	MCQ	2 Hrs
2.	2290122	DC	Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended	AO	2 Hrs
3.	2250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
4.	2100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
5.	2290123	DC	Digital Electronics	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP	2 Hrs
			Total	250	50	100	100	180	60	60	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 (IC); Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Deptt./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

Theory			Lab		Total
Offline	Blended Offline	Online	Offline	Online	
-	8	4	3	4	
4					
21	42	21	16	21	

Mode of Examination

Theory			Lab		Total Credits
AO	PP	MCQ	Offline	MCQ	SO
4	11	4	3	4	-	19
21	58	21	16	21		

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Computer Science and Engineering

Scheme of Evaluation

B. Tech. II Semester (Computer Science and Design)

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	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.	2290221	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP	2 Hrs
2.	2290222	DC	Python Programming	50	10	20	20	60	20	20	200	3	-	2	4	Blended	AO	2 Hrs
3.	2290223	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
4.	2290224	DC	Computer Graphics and Animation	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	-	-	3	Offline	PP	2 Hrs
6.	2290225	DLC	Hardware and Troubleshooting Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO	-
			Total	250	50	100	100	240	80	80	900	13	02	08	19	-	-	-
7.	3000001	Natural Sciences & Skills	Engineering Physics	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 PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab		Theory			Lab		Total Credits
Offline	Blended		Online	Offline	Online	PP	AO	MCQ	Offline	SO	
	Offline	Online									
3	-	8	4	4	4	14	4	-	4	1	19
16		42	21	21	21	74	21	-	21	5	

Syllabi of
Departmental Courses (DC) Courses
B. Tech I Semester
For batch admitted 2022-23
(Computer Science and Engineering)
Under Flexible Curriculum

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DIGITAL ELECTRONICS (2150121)

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,

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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

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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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List of Experiment

Computer Programming(150122)

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(2150122)

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/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.

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Emerging Technologies in Computer Science (2150123)

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:

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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

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Engineering Mathematics –I (2100011)

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.

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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: 2100022

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:

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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 (2100022)

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.

Skill-Based Mini Project

Basic Electrical & Electronics Engineering

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.

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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

IT WORKSHOP (2150124)

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:

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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[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.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IT WORKSHOP

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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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.

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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.

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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.

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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.

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Annexure-8D

Syllabi of
Departmental Courses (DC) Courses
B.Tech I Semester
For batch admitted 2022-23
(Computer Science & Design)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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Department of Computer Science and Engineering

INTRODUCTION TO COMPUTER SCIENCE AND DESIGN (2290121)
(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.

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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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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

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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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List of Experiment

Computer Programming(2290122)

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(2290122)

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/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.

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LINEAR ALGEBRA (2250100)

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

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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

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Basic Electrical & Electronics Engineering: 2100022

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:

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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 (2100022)

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

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 (2290123)

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.

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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

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

Skill Based Project

- 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

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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 &

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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.

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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.

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Annexure - BE

Syllabi of
Departmental Courses (DC) Courses
B.Tech II Semester
For batch admitted 2022-23
(Computer Science and Engineering)
Under Flexible Curriculum

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Department of Computer Science and Engineering

DATA STRUCTURES
(2150221) (DC)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

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Unit-V

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgrawhill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

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

CO1. outline the basics of Algorithms and their performance criteria's.

CO2. explain the working of linear/Non Linear data structures.

CO3. identify the appropriate data structure to solve specific problems.

CO4. analyze the performance of various Data Structures & their applications.

CO5. evaluate the time/space complexities of various data structures & their applications.

CO6. design the optimal algorithmic solutions for various problems.

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Data Structure
Experiment List

Write C/C++ Programs to illustrate the concept of the following:

1. Implementation of Array and linked list.

2. Implementation of Sorting Algorithms-Non-Recursive and Recursive.

3. Implementation of Searching Algorithms-Linear and Binary Search.

4. Implementation of Stack using Array.

5. Implementation of Queue using Array.

6. Implementation of Circular Queue using Array.

7. Implementation of Stack using Linked List.

8. Implementation of Queue using Linked List.

9. Implementation of Circular Queue using Linked List.

10. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.

11. Graph Implementation, BFS, DFS, Minimum cost spanning tree, shortest path algorithm.

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Data Structure
skill-based project list

1. Develop an application to calculate the address of given index position of 2D,3D,4D and nD array elements.

2. Develop an utility to store polynomial equations and to add two polynomial equations.

3. Design the solution of Tower of Hanoi mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

a) Only one disk can be moved at a time.

b) Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.

c) No disk may be placed on top of a smaller disk. Develop an application to generate preoder, postorder and inorder traversing sequences of given binary tree.

4. Design a Palindrome-Checker algorithm and implement the utility for Palindrome checking. A palindrome is a string that reads the same forward and backward, for example, radar, toot, and madam.

5. Design a solution of the Word Ladder Problem and develop a software. Example - Transform the word "FOOL" into the word "SAGE". In a word ladder puzzle, you must make the change occur gradually by changing one letter at a time. At each step you must transform one word into another word, you are not allowed to transform a word into a non-word.

6. Develop an application to solve Single-Source Shortest Path (SSSP) problem All-Pairs Shortest Path (APSP).

7. Find out Longest Increasing Subsequence in the given elements. The Longest Increasing Subsequence (LIS) problem is to find the length of the longest subsequence of a given sequence such that all elements of the subsequence are sorted in increasing order. For example, the length of LIS for {10, 22, 9, 33, 21, 50, 41, 60, 80} is 6 and LIS is {10, 22, 33, 50, 60, 80}.

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

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Department of Computer Science and Engineering

Python Programming (2150222)

COURSE OBJECTIVES

- To understand the structure and components of a Python program.
- To learn the basic construct of python programming for implementing interdisciplinary research-based problems.
- To plot data using appropriate Python visualization libraries for analysis.

Unit I
Introduction to Python: Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements, introducing loops, working of input function.

Unit II
Tuples and Lists: Tuples, lists, list operations, using if statements with lists, organizing a list, working with lists: looping through an entire list, making numeric lists, working with part of a list. dictionaries and sets: simple dictionary, looping through a dictionary, nesting, example with a dictionary, fibonacci and dictionaries, global variables, defining a set, set operations.

Unit III
Functions: Defining a function, passing arguments, return values, passing a list, passing an arbitrary number of arguments, storing your functions in module, in built functions, lambda functions. classes and inheritance: object oriented programming, creating and using a class, working with class instances, methods, inheritance, importing classes, python standard library.

Unit IV
Files and Exceptions: Reading from a file, writing to a file, file operations, assertions, exceptions, exception example. debugging: programming challenges, classes of tests, bugs, and debugging, debugging examples.

Unit V
Data Visualization: Installing matplotlib, plotting a simple line graph, random walks, making histogram. graphical user interfaces: event-driven programming paradigm; tkinter module, creating simple gui; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors, layouts, nested frames.

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RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes

- Learn Python the Hard Way: 3rd Edition

- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.

- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

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

CO1. understand basic python programming constructs **CO2.**
analyze various data structures available in python

CO3. implement the Object-oriented programming paradigm in Python

CO4. apply the different File handling operations

CO5. design GUI Applications in Python

CO6. construct graphical representation of data using python packages

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List of Program

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1. Python program to take input from user and display "Hello MITS Gwalior".
2. Python program to do arithmetic operations.
3. Python program to find area of rectangle, circle and triangle.
4. Python program to check number is even or odd, prime not prime.
5. Python program find factorial of a number.
6. Python program to check year is leap year or not.
7. Python Program to implement the operation on List, Tuple, Set and Dictionary.
8. Python Program to handle the exception and file handling operation.
9. Python Program to create and use of user defined function.
10. Python Program to solve a problem using Lambda function
11. Python Program for creating an object with and without inheritance.

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Skill Based Project

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1. Visualize the Publically available real world data set using various function and identify the suitable plot for better representation.
2. Handle the missing data and categorical value in a real world Data Set.
3. Build a prediction model based on Classification Data Set.
4. Build a prediction model based on Regression Data Set.
5. Build a prediction model based on Clustering Data Set.

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COMPUTER SYSTEM ORGANIZATION
(DC)(2150223)

COURSE OBJECTIVES

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von-Neumann Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro- Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro- Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).Hardwired and Micro programmed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming, Introduction to Pipelining & Multiprocessors.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA Transfer),

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Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar,
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES
After completion of the course students would be able to:

CO1. Recall the basic building blocks of computer Architecture.
CO2. Explain different memories and the functional units of a processor.
CO3. Explain the concept of working of microprocessor, multiprocessor and pipelining.
CO4. Analyze various modes of Input-Output data transfer.
CO5. Evaluate the arithmetic related to the number system.
CO6. Develop the skill of writing low level programming.

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Department of Computer Science and Engineering

COMPUTER GRAPHICS
2150224(DC)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object Design

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Unit-1

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, And Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc., Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc., Area Filling, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm.

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Unit-V

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, and Color Models like RGB, YIQ, CMY, HSV etc., and Introduction to Digital Image Processing (DIP), Fundamental Steps and Components of DIP.

RECOMMENDED BOOKS

- Computer Graphics, Donald Hearn and M.P. Becker, PHI Publication.
- Computer Graphics principle and Practice, FoleyVandam, Feiner, Hughes.
- Principles of Computers Graphics, Rogers, TMH.
- Computer Graphics, Sinha and Udai, TMH.
- Digital Image Processing, Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. Explain interactive Computer Graphics, various display devices and explore applications of computer graphics.

CO2. Illustrate various line generations, circle generation, curve generation and shape Generation algorithms.

CO3. Apply various 2-Dimensional and 3-Dimensional transformations and projections on Images.

CO4. Classify methods of image clipping and various algorithms for Line and Polygon clipping.

CO5. Choose appropriate filling algorithms, Hidden Surface Elimination algorithm and apply on various images.

CO6. Discuss various color models, shading methods, animation and Digital Image Processing.

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Department of Computer Science & Engineering

COMPUTER GRAPHICS
2150224(DC)

List of Experiments

1. Installation and Introduction to OpenGL basics, graphic functions, commands for compiling and executing an OpenGL Program.
2. Write an OpenGL Program to create an output window, to plot a point with given coordinates and other basic demonstrations.
3. Write an OpenGL Program to implement DDA Line Drawing Algorithm.
4. Write an OpenGL Program to implement Bresenham Line Algorithm.
5. Write an OpenGL Program to implement Mid-Point Circle Algorithm.
6. Write an OpenGL Program to implement following 2D transformations:
    i. Translation of a point, line and polygon.
    ii. Scaling of a line and polygon.
    iii. Rotation of a line and polygon around origin.
7. Write an OpenGL Program to implement:
    i. Flood Filling Algorithm using polygon.
    ii. Boundary Filling Algorithm using polygon.

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Skill Based Projects

1. Develop a project to implement a stretch band effect. In which a user will click on the screen and drag the mouse / arrow keys over the screen coordinates. The line should be updated like rubber-band and on the right-click gets fixed.
2. Develop a project to implement the DDA algorithm for drawing line. In this project a programmer is expected to shift the origin to the center of the screen and divide the screen into required quadrants.
3. Develop a project with menu option to input the line coordinates from the user to generate a line using Bresenham's method and DDA algorithm.
4. Develop a project to demonstrate 2D animation such as clock simulation.
5. Develop a project to demonstrate 2D animation such as rising sun.
6. Develop a project to implement the bouncing ball inside a defined rectangular window.
7. Develop a project to to draw Bezier and B-Spline Curves with interactive user inputs for control polygon defining the shape of the curve.
8. Develop a project to demonstrate shear transformation in different directions on a unit square situated at the origin.
9. Develop a project in which a set of lines and a rectangular area of interest is given by user, the task is to remove lines which are outside the area of interest and clip the lines which are partially inside the area.

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Department of Computer Science and Engineering

Hardware and Troubleshooting Lab(2150225)

COURSE OBJECTIVES:

- To understand various number systems, boolean algebra, logic Gates.
- To acquire the knowledge of a computer system, motherboard and Its processing unit.
- To be aware of different memories, I/O devices, installation and SMPS.

Unit – I:

Number System, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit – II:

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

Unit – III:

Sequential Circuits, Latches, Flip-Flops: Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop, Registers. Integrated circuits.

Unit – IV:

Introduction of Motherboard, components of Motherboard, Types of Motherboard, Bios, Form-factor, CPU Sockets, types of memory sockets, IDE Ports, chipset, Integrated Peripherals, Peripheral card slots, Bootstrapping process.

Unit – V:

Introduction to Memory, Types of Memory, Installation and Partition of Hard Disk, Working of HDD and SDD. Basics of I/O Devices, Buffering and spooling, Introduction to Ports, Identify the Different Ports, Ports Troubleshooting. Linux and Windows Installation. SMPS (Switch Mode Power Supply).

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.
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Third Edition.

COURSE OUTCOMES:

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

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CO1. Illustrate the concept of number system and Boolean algebra.
CO2. Demonstrate installation of OS and connections through ports at basic level.
CO3. Build various circuits and inspect their working.
CO4. Examine the ICs specifications and their functioning.
CO5. Explain the concept of Memory, Motherboard, Bus, and SMPS.
CO6. Choose appropriate logic gates to design combinational & sequential circuits.

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Hardware LAB

List of Experiments

1. Study the different parts of computer system
2. Study different parts of motherboard
3. Study various types of connectors
4. Draw the pin details of various connectors
5. Study CMOS setup
6. Partition and format the hard disc
7. Installation of OS: Linux and windows
8. Connect systems in network using switch
9. Connect the systems in peer to peer network
10. Configure e-mail server
11. Configure e-mail client
12. Configure browser for Internet access using proxy server
13. Configure Virtual Private Network (VPN)
14. Study of PC Troubleshooting.

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Skill Based Project

- To create a multiple Star topology.
- To connect a multiple hard disk drive in a computer and then create a multiple volume.
- To create multiple Wi-Fi access network.
- How to do complete pc assembling.
- To create a domain server with a client .
- To create a DHCP server and assign dynamic IP address in a local pc
- Explain in detail to install multiple windows in a pc
- To create pair to pair network
- To create combine LAN & WAN network.
- To describe IP address and a connect pc different network IP address.

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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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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.