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

BOARD OF STUDIES (BoS) PROCEEDING IN INFORMATION TECHNOLOGY

(Meeting Dated – 28th May, 2022)

DEPARTMENT OF INFORMATION TECHNOLOGY

Summary of Board of Studies (BoS)

Courses where revision was carried out

[illegible] (Name)	Course Code	Year / Date of introduction	Year / Date of revision	[illegible] content added or replaced	Agenda Item No.	Page No.
Database Management System	160313/230304/240304	10/06/2021	28/05/2022	4.41%	ITEM IT - 15	06

DEPARTMENT OF INFORMATION TECHNOLOGY

Summary of Board of Studies (BoS)

Course 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.
Social Networks	160754	Social networks available online in the form of graphs holding hidden information, surprising secrets have been time and again revealed with the help of tools like graph theory, sociology, game theory etc.	ITEM IT - 04	02
Big Data Computing	160756	This course provides an in-depth understanding of terminologies and the core concepts behind big data problems, applications, systems and the techniques, that underlie today's big data computing technologies.	ITEM IT - 04	02
Python Programming	240305/ 270306/ 280306	Python is a general purpose, high-level programming language; other high- level languages you might have heard of C++, PHP, and Java. Virtually all modern programming languages make us of an Integrated Development Environment (IDE), which allows the creation, editing, testing, and saving of programs and modules.	ITEM IT - 14	06
Design and Thinking Lab	230305	Students to learn basic prototyping skills needed to develop modules needed for Industry 4.0	ITEM IT - 15	06

Summary of Board of Studies (BoS)

New Courses

[illegible] (Subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.
Analytics using R Programming	900227	This course will give knowledge about how to use RStudio, the environment that allows you to work with R and this will equip you with the skills needed to apply to introductory-level data analyst jobs.	ITEM IT - 05	03
Soft Computing Techniques	160515/230505/ 240505	As we know that, most of the companies use soft computing algorithm to build AI based projects. So here students can learn and apply subject knowledge of soft computing techniques to analyze real problems and apply that to solve the problems.	ITEM IT - 08	04
Robotics System and Control	240504	This subject will give knowledge of robotics system and its control. Students can use subject knowledge to understand the working of small robots. That knowledge is essential for AI and robotics engineers. That will improve skills towards current requirements of companies.	ITEM IT - 08	04
Data Science using Python	160512/240502	This subject will provide skills to the students by understanding exemplary models on various real time applications.	ITEM IT - 08	04
Embedded System & IoT	230504	With embedded systems and IoT students will gain skill of various micro controllers used for IoT boards.	ITEM IT - 08	04
Data Sciences in IoT	230502	Analytics in IoT will provide skills to the students by understanding exemplary models on various real time applications.	ITEM IT - 08	04

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DEPARTMENT OF INFORMATION TECHNOLOGY

Summary of Board of Studies (BoS)

Feedback on curriculum received from stakeholders: Analysis & ATR

Stakeholder	Student	Faculty	Alumni	Employer
No. of responses	**127** *[July – December 2021 (V & VII Sem)]* **143** *[September 2021 to January 2022 (III Sem)]* **405** *[October 2021 – March 2022 (II Sem)]* **305** *[January – April 2022 (IV Sem)]* **56** *[January – April 2022 (VI Sem)]*	**10** *[July – December 2021 (V & VII Sem)]* **12** *[September 2021 to January 2022 (III Sem)]* **14** *[October 2021 – March 2022 (II Sem)]* **13** *[January – April 2022 (IV Sem)]* **02** *[January – April 2022 (VI Sem)]*	**46**	**67**
Link of Analysis	Analysis Link	Analysis Link	Alumni FB Link	Employer FB Link
ATR Link	ATR Link	ATR Link	Alumni FB Link	Employer FB Link
Link showing Excel sheet of Google Form details of stakeholders	Link *[July – December 2021 (V & VII Sem)]* Link *[September 2021 to January 2022 (III Sem)]* Link *[October 2021 – March 2022 (II Sem)]* Link *[January – April 2022 (IV Sem)]* Link *[January – April 2022 (VI Sem)]*	Link *[July – December 2021 (V & VII Sem)]* Link *[September 2021 to January 2022 (III Sem)]* Link *[October 2021 – March 2022 (II Sem)]* Link *[January – April 2022 (IV Sem)]* Link *[January – April 2022 (VI Sem)]*	Alumni FB responses	Employer FB responses

Madhav Institute of Technology & Science, Gwalior-474 005

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

Department of Information Technology

Date: 28th May 2022

Minutes of Meeting of Board of Studies (BoS) in Information Technology

The Meeting of **Board of Studies (BoS)** in **Information Technology** was held on 28th May, 2022 at 11:30 A.M. onwards **in offline mode / online mode (through video conferencing)**. During the meeting, following were present.

1.	Dr. Akhilesh Tiwari, Professor & Head	Chairman
2.	Dr. Surya Prakash Discipline of Computer Science and Engineering, School of Engineering, Indian Institute of Technology Indore Indore-453552, Madhya Pradesh, India	External Member (Academics) ***(Nominee of Hon'ble Vice Chancellor RGPV Bhopal)***
3.	Dr. Deepak Garg, Professor & Head, Department of Computer Science Engineering Bennett University, Greater Noida, Uttar Pradesh	External Member (Academics)
4.	Dr. Nisha Chaurasia, Assistant Professor, Department of Information Technology, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar (Punjab)	External Member (Alumnus)
5.	Dr. Vivek Tiwari, Department of Computer Science Engineering, International Institute of Information Technology, Naya Raipur (IIIT-NR)	Invitee Member (Academics)
6.	Dr. Sanjiv Sharma, Assistant Professor	Member
7.	Mr. Punit Kumar Johari, Assistant Professor	Member
8.	Mr. Vikas Sejwar, Assistant Professor	Member
9.	Mr. Abhilash Sonker, Assistant Professor	Member
10.	Ms. Neha Bhardwaj, Assistant Professor	Member
11.	Dr. Saumil Maheshwari, Assistant Professor	Member
12.	Dr. Vikram Rajpoot, Assistant Professor	Member
13.	Dr. Dhananjay Bisen, Assistant Professor	Member
14.	Dr. Tej Singh, Assistant Professor	Member
15.	Dr. Pawan Dudey, Assistant Professor	Member
16.	Mr. Abhishek Dixit, Assistant Professor	Member
17.	Dr. Bhagat Singh Raghuwansi, Assistant Professor	Member
18.	Dr. Nidhi Saxena, Assistant Professor	Member

In addition to above, faculty members under contractual engagement were also present.
The following external and internal members could not attend the meeting.

1.	Dr. Dinesh Kumar Vishwakarma, Professor, Department of Information Technology, Delhi Technological University (DTU), Delhi	External Member (Academics)
2.	Mr. Abhinav Mishra, Sr Director, Persistent System Limited	External Member (Industry)
3.	Mr. Rajeev Kumar Singh, Assistant Professor	Internal Member

The following student members/ representatives were also present in the meeting.

1.	Amrit Kaur (0901EC191020)	B. Tech IT Third year
2.	Harshita Vishwakarma (0901IT191026)	B. Tech IT Third year

The following deliberation took place in the meeting:

ITEM **IT-1:**	To confirm the minutes of previous BoS meeting held in the month of December 2021 **The minutes of previous Board of Studies (BoS) meeting held on 22nd December 2021 were presented, discussed and confirmed.**
ITEM **IT-2:**	To prepare and finalize the scheme structure of B. Tech. VII Semester with the provision of *Two Departmental Electives (DEs) and Two Open Category (OC) Course* (in which both Departmental Elective is to be offered in online mode with credit transfer) for the batch admitted in 2019-20. **The Scheme of B. Tech. VII semester** [Information Technology] **(batch admitted 2019-20), were discussed and recommended.** The Scheme is annexed as **Annexure-I.**
ITEM **IT-3:**	To prepare and finalize the syllabus of courses to be offered *(for batch admitted in 2019-20)* under *Departmental Elective (DE) Course* (in traditional mode) for B. Tech. *VII Semester* along with their COs **The courses to be offered under Departmental Elective (DE-3) category (in offline mode) for B. Tech VII Semester, IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail. The detailed syllabi (along with their COs) is Annexed** as Annexure - II. **DE-3 (B. Tech IT):** • Data Mining & Predictive Modelling • Soft Computing • Mobile Computing
ITEM **IT-4:**	To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC Platform, to be offered in *online mode under Departmental Elective (DE) category*, with credit transfer in the *VII Semester (Batch admitted in 2019-20)* **The list of Departmental Elective (DE-4) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform (in online mode) for B. Tech VII Semester IT discipline (under flexible curriculum) were discussed and finalized, as per the following detail** **DE-4 (B. Tech IT):** • Scalable Data Science (8 Week) • Social Networks (12 Week) • Big Data Computing (8 Week) ***In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) course may be kept dynamic and newly***

	emerging courses may be inducted in line with the industrial need and emerging developments (as and when desired).
ITEM **IT-5:**	To prepare and finalize the syllabus of courses to be offered *(for batch admitted in 2019-20)* under the *Open Category (OC) Courses* (in traditional mode) for B. Tech. *VII semester* students of other departments along with their Cos **The courses to be offered under Open Category (OC) Courses for B. Tech VII Semester (for the students of other departments) under flexible curriculum, were discussed and finalized, as per the following detail** **OC-2:** • Soft Computing **OC-3:** • Analytics using R 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).*****The detailed syllabi (along with their COs) is annexed as Annexure-III.**
ITEM **IT-6:**	To prepare and finalize the Experiment list/ Lab manual for Departmental Laboratory Course (DLC) to be offered in B. Tech. VII semester *(for batches admitted in 2019-20)* **The experiment list / lab manual for the Laboratory Courses for B. Tech VII semester were discussed and finalized. The same is annexed as Annexure-IV.**
ITEM **IT-7:**	To propose the list of "Additional Courses" which can be opted for getting an ***(i) Honours (for students of the host department)*** ***(ii) Minor Specialization (for students of other departments)*** *[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the* B. Tech. ***VII semester students*** *(for the batch admitted in 2019-20)] and for* B. Tech. ***V semester*** *(for the batch admitted in 2020-21)]* **The courses available on SWAYAM/NPTEL/MOOC based learning platforms for Honours and Minor Specialization were discussed and identified. The same has been listed, as mentioned below**

B. Tech V Semester (2020-21 admitted batch)
Additional Courses for "Honours" (Parent Department)
B. Tech Information Technology • Software Project Management (12 Week) • Distributed Systems (8 Week) • The Joy of Computing using Python (12 Week) **B. Tech Internet of Things (IoT)** • Hardware Modeling Using Verilog (8 Week) • Design & Implementation of Human-Computer Interfaces (12 Week) • The Joy of Computing using Python (12 Week) **B. Tech Information Technology (Artificial Intelligence and Robotics)** • Machine Learning for Earth System Sciences (8 Week)

	• Design & Implementation of Human-Computer Interfaces (12 Week) • The Joy of Computing using Python (12 Week) **Additional Courses for "Minor Specialization" (Other Departments)** **Provision of Domain Specific Courses for minor specialization (as available on the SWAYAM/NPTEL platform), as follows:** **B. Tech Information Technology** • Programming, Data Structures and Algorithms in Python (8 Week) • Programming in Java (12 Week) • Introduction to Operating Systems (8 Week) **B. Tech Internet of Things (IoT)** • Introduction to Internet of Things (12 Week) • Introduction to Operating Systems (8 Week) • Programming, Data Structures and Algorithms in Python (8 Week) **B. Tech Information Technology (Artificial Intelligence and Robotics)** • Introduction to Machine Learning (12 Week) • Introduction to Operating Systems (8 Week) • Programming, Data Structures and Algorithms in Python (8 Week) **B. Tech VII Semester (2019-20 admitted batch)** **Additional Courses for "Honours" (Parent Department)** • Computer Vision (12 Week) • Deep Learning (12 Week) • Distributed Systems (8 Week) **Additional Courses for "Minor Specialization" (Other Departments)** **Domain 1: Programming** • Introduction to Machine Learning (12 Week) • Data Science for Engineers (8 Week) **Domain 2: Systems** • Real-Time Systems (12 Week) • MultiCore Computer Architecture-Storage and Interconnects (8 Week)
ITEM **IT-8:**	To prepare and recommend the *scheme structure of B. Tech. V Semester under* the flexible curriculum (*Batch admitted in 2020-21)* **The Scheme of B. Tech. V semester [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)] (batch admitted 2020-21), were discussed and recommended. The Scheme is annexed as Annexure-V.**
ITEM **IT-9:**	To prepare and recommend the syllabi for all *Departmental Core (DC) Courses* of B. Tech. *V Semester (for b*atch admitted in 2020-21) under the flexible curriculum along with their COs.

	The Syllabi (along with the Course Outcomes) of B. Tech. V* [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)] (*batch admitted 2020-21 onwards), were discussed and finalized. The same is annexed as Annexure- VI.
ITEM **IT-10:**	To prepare and recommend the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B. Tech V semester *(for batch admitted in 2020-21)* **The experiment list / lab manual for the laboratory courses for B. Tech V semester [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)] were discussed and finalized. The same is annexed as** Annexure-VII.
ITEM **IT-11:**	To prepare and recommend the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory component based courses to be offered in B. Tech. V Semester ***(for the batch admitted in 2020-21)***. **The list of "skill based mini project" for the Laboratory Courses of B. Tech. V Semester (for 2020-21 admitted batch) was discussed and finalized. It is also discussed that the list must be treated as dynamic and more projects can be added by the course faculty. The same is annexed as** Annexure-VIII.
ITEM **IT-12:**	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered *(for batch admitted in 2020-21)* in online mode under *Self-Learning/ Presentation*, in the B. Tech. *V Semester* **The courses to be offered under Self-Learning/ Presentation through SWAYAM / NPTEL based learning platform for B. Tech. V semester (2020-21 admitted batch) [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)], under flexible curriculum were discussed and finalized, as per the following** **B. Tech. V Semester** • Python for Data Science (4 Week) • Demystifying networking (4 Week) ***To promote the self-learning, it is mandatory to register for one online course (as per above list) from the SWAYAM / NPTEL platform under the Seminar / Self Study Course. Further, the evaluation will be based on attendance, assignments and presentations, etc.***
ITEM **IT-13:**	To prepare and recommend the Scheme & Syllabi (along with the Course Outcomes) of B. Tech. III semester of the newly started B. Tech. programmes in the emerging areas [Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning] (started from 2021-22 Session) **The Scheme & Syllabi *(along with the Course Outcomes)* of B. Tech. programmes in the emerging areas [Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning] III semester (*batch admitted 2021-22*) were discussed and finalized. The scheme & detailed syllabi is annexed as** Annexure-IX.

ITEM **IT-14:**	To prepare and recommend the list of experiments and skill based mini projects of *B. Tech. III semester* of the newly started B. Tech. programmes in the emerging areas (Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning) (started from 2021-22 Session) **The experiment list / lab manual and skill based mini project for the Laboratory Courses for B. Tech III semester (Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning) were discussed and finalized. The same is annexed as** Annexure-X. *The list of "skill based mini project" for the Laboratory Courses must be treated as dynamic and more projects can be added by the course faculty.*
ITEM **IT-15:**	To review, prepare, finalize and recommend the *Scheme & Syllabi (along with the Course Outcomes) of III semester* B. Tech. programmes (batch admitted 2021-22 Session) **The Scheme & Syllabi *(along with the Course Outcomes)* of B. Tech. programmes [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)] III semester (*batch admitted 2021-22*) were discussed and finalized. The Scheme & detailed syllabi are annexed as** Annexure-XI.
ITEM **IT-16:**	To review, prepare, finalize and recommend the list of experiments/ Lab manual and skill based mini projects for various laboratory courses to be offered in III Semester *(for the batch admitted in 2021-22).* **The experiment list / lab manual and skill based mini project for the Laboratory Courses for B. Tech III semester [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics)] were discussed and finalized. The same is annexed as** Annexure-XII. *The list of "skill based mini project" for the Laboratory Courses must be treated as dynamic and more projects can be added by the course faculty.*
ITEM **IT-17:**	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered *(for batches admitted in 2021-22)* in online mode under *Self-Learning Presentation*, in the *III Semester* **The courses to be offered under Self-Learning/ Presentation through SWAYAM / NPTEL based learning platform for B. Tech. III semester (2021-22 admitted batch) [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics), Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning], under flexible curriculum were discussed and finalized, as per the following** **B. Tech. III Semester** • Programming, Data Structures And Algorithms Using Python (8 Week) • Getting Started with Competitive Programming (12 Week) ***To promote the self learning, it is mandatory to register for one online course (as per above list) from the SWAYAM / NPTEL platform under the Seminar / Self Study Course. Further, the evaluation will be based on attendance, assignments and presentations, etc.***

ITEM **IT-18:**	To review the *Scheme & Syllabi, list of experiments and skill based mini projects of First semester* of the B. Tech. programmes *(for the batch 2022-23).* ***The Scheme & Syllabi, list of experiments and skill based mini projects of First semester* of the B. Tech. programmes [Information Technology, Internet of Things (IoT), Information Technology (Artificial Intelligence and Robotics), Artificial Intelligence and Data Science, Artificial Intelligence and Machine Learning], (*batch admitted 2022-23), were discussed and finalized.* The same is annexed as Annexure-XIII.**
ITEM **IT-19:**	To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for (i) I year November 2021 – February 2022 Semester (ii) July-December 2021 Session for II to IV year students **The attainment levels of Course Outcomes (COs) for all the courses pertaining to November 2021 – February 2022 semester and July-December 2021 Semester were presented and reviewed. The house appreciated the same and observed the achievement of target attainment levels for almost all the courses. The same is enclosed as Annexure-XIV.**
ITEM **IT-20:**	To review PO attainment of 2017-2021 batch, CO-PO mapping matrix with attainments and gap analysis **The Programme Outcome (PO) attainment, CO-PO mapping matrix with attainments and gap analysis for 2017-2021 passout batch were discussed and reviewed. The same is annexed as Annexure-XV.**
ITEM **IT-21:**	To review the curricula feedback from various stakeholders, its analysis and impact **The summarized report of curricula feedback from various stakeholders (students, faculty members and alumni etc.) (July – December 2021 (B. Tech V & VII Sem), September 2021 - January 2022 (B. Tech III Sem), October 2021 – March 2022 (B. Tech II Sem), January - April 2022 (B. Tech IV & VI Sem)) was presented and discussed. This was based on various considered parameters. Further, the house has reviewed the feedback & its summarized report and efforts made where appreciated. The report is annexed as Annexure-XVI.**
ITEM **IT-22:**	To review the Course Outcomes (COs) feedback of various courses, its analysis, and ATR **The detailed analysis and impact report of Course Outcomes (COs) feedback of various courses from students (for November 2021 – February 2022 semester and July-December 2021) was presented and discussed.** **The same is annexed as Annexure -XVII.**

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - I

Scheme
of
B. Tech VII Semester
(Batch Admitted in 2019-20)
(Information Technology)
Under Flexible Curriculum

[ITEM IT -2]

ITEM **IT-23:**	Any other matter: To discuss and consider the Modules/Courses to be offered under Summer Internship Project–I (SIP-I), Novel Engaging Course (NEC) and Skill Enhancement Program (SEP). **The list of Modules/Courses under Summer Internship Project–I (SIP-I), Novel Engaging Course (NEC) and Skill Enhancement Program (SEP) as per the following were discussed and considered.** SUMMER INTERNSHIP PROJECT – I (SIP-I) MODULES • **Programming using Python** • **Imbalanced Learning for classification** • **Problem Solving through programming** • **JAVA (Core)** • **Data Handling Through MATLAB programming** • **Scientific writing Tools** NOVEL ENGAGING COURSES (NEC) • **Digital Learning** • **IT Tools** • **Understanding Financial Markets** • **Python for Image processing applications using Open CV** • **Statistical data analysis through programming** • **Imbalance Learning** • **Integrating Engineering and Literacy** SKILL ENHANCEMENT PROGRAM (SEP) MODULES • **Google Services** • **Deep Learning – Basics to Advance** **The detail of Modules/Courses is annexed as Annexure -XVIII.**

Suggestions by External Experts / Members:

- It was suggested to include practical slot of two hours by reducing one lecture slot in the cours "Analytics in IoT", for the B. Tech. V semester (Internet of Things (IoT)) (2020-21 admitted batch).
- Minor changes were suggested in the syllabi of course "Embedded & IoT", for the B. Tech. ' semester (Internet of Things (IoT)) (2020-21 admitted batch).

The meeting ended with the vote of thanks to all the members.

(Ms. Namrata Agrawal) (Dr. Nidhi Saxena) (Dr. Bhagat Singh Raghuwansi) (Mr. Abhishek Dixit)

(Dr. Pawan Dubey) (Dr. Tej Singh) (Dr. Dhananjay Bisen) (Dr. Vikram Rajpoot)

(Dr. Saumil Maheshwari) (Ms. Neha Bhardwaj) (Mr. Abhilash Sonkar) (Mr. Vikas Sejwar)

(Mr. Punit Kumar Johri)

(Dr. Sanjiv Sharma)

Absent.

(Mr. Abhinav Mishra)
Sr. Director,
Persistent System Limited

Online present

(Dr. Nisha Chaurasia)
Assistant Professor,
Department of Information Technology, Dr. B. R. Ambedkar National Institute of Technology,
Jalandhar (Punjab)

Online present

(Dr. Vivek Tiwari)
Assistant Professor,
Departmentof Computer Science Engineering,
International Institute of Information Technology,
Naya Raipur (IIIT-NR)

Absent

(Dr. Dinesh Kumar Vishwakarma)
Professor,
Department of Information Technology,
Delhi Technological University (DTU), Delhi

Online present

(Dr. Deepak Garg)
Professor& Head,
Department of Computer Science Engineering
Bennett University, Greater Noida, Uttar Pradesh

Online present

(Dr. Surya Prakash)
Professor,
Discipline of Computer Science and Engineering, School of Engineering,
Indian Institute of Technology Indore

28/5/2022

(Dr. Akhilesh Tiwari)
Professor & Head,
Department of IT,
MITS Gwalior
[Chairman, BoS]

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

GROUP A: I Semester

B.Tech. I Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100201	BSC	Engineering Physics (BSC-1)	70	20	10	30	20	150	2	1	2	4
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-1)	70	20	10	-	-	100	3	-	-	3
3.	100203	ESC	Basic Computer Engineering (ESC-1)	70	20	10	30	20	150	3	-	2	4
4.	100204	ESC	Basic Mechanical Engineering (ESC-2)	70	20	10	30	20	150	3	-	2	4
5.	100205	ESC	Basic Civil Engineering &Mechanics (ESC-3)	70	20	10	30	20	150	3	-	2	4
6.	100206	HSMC-2	Language Lab. & Seminars (HSMC-2)	-	-	-	30	20	50	-	-	4	2
Total				350	100	50	150	100	750	14	1	12	21
NSS/NCC				Qualifier									

Induction programme of first 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

GROUP A: (Electrical, Electronics, Computer Science& Engineering, **Information Technology**, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

01Theory Period=1 Credit; 02 Practical Periods =1 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

Group A: II Semester

B.Tech. II Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-2)	70	20	10	30	20	150	3	-	2	4
2.	100102	BSC	Engineering Mathematics-I (BSC-3)	70	20	10	-	-	100	3	1	-	4
3.	100103	HSMC	Technical English (HSMC-3)	70	20	10	30	20	150	3	-	2	4
4.	100104	ESC	Basic Electrical & Electronics Engineering (ESC-4)	70	20	10	30	20	150	3	-	2	4
5.	100105	ESC	Engineering Graphics (ESC-5)	70	20	10	30	20	150	3	-	2	4
6.	100106	ESC	Manufacturing Practices (ESC-6)	-	-	-	30	20	50	-	-	2	1
Total				**350**	**100**	**50**	**150**	**100**	**750**	**15**	**1**	**10**	**21**
NSS/NCC				**Qualifier**									
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration													

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. III Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional		L	T	P	
1.	100001	BSC-4	Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	160301	DC-1	Digital Electronics (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	160302	DC-2	Data Structures (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	160303	DC-3	Computer Graphics & Multimedia (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	160304	DC-4	Object Oriented Programming and Methodology (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	160305	DLC-1*	Hardware Lab* (DLC-1)	-	-	-	30	20	50	-	-	2	1
7.	160306	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	160307	DLC	Summer Internship Project–I (Institute Level) (Evaluation)	-	-	-	25	-	25			4	2
Total				350	100	50	145	105	750	15	2	14	24
9.	100002$	MC-1	Biology for Engineers(Audit Course)	70	20	10	-	-	100	3		-	03
NSS/NCC				Qualifier									

 # Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation.

$ Course will run for Group A/B in III/IV semester respectively (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

***Virtual Lab to be conducted along with the traditional lab**

GROUP A: (Electrical, Electronics, Computer Science & Engineering, **Information Technology**, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. IV Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Term work Lab Work & Sessional		L	T	P	
1.	100003	BSC	Mathematics- III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	160401	DC	Design & Analysis of Algorithms (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	160402	DC	Database Management System (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	160403	DC	Operating System (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	160404	DC	Computer System Organization (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	160405	DLC	Programming Lab* (DLC-2)	-	-	-	30	20	50	-	-	6	3
Total				**420**	**120**	**60**	**90**	**60**	**750**	**14**	**7**	**10**	**26**
NSS/NCC				**Qualifier**									
Summer Internship Project-II (Softskills Based) for two weeks duration: Evaluation in V Semester													

***Virtual Lab to be conducted along with the traditional lab**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. V Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem Exam.	Quiz/ Assisgn ment	End Sem.	Lab work & Sessional		L	T	P	
1.	100005*	HSMC	Ethics, Economics, Entrepreneurship & Management (HSMC-4)	70	20	10	-	-	100	3	-	-	3
2.	160501	BSC	Discrete Structures (BSC- 6)	70	20	10	-	-	100	3	1	-	4
3.	160502	DC	Software Engineering (DC-9)	70	20	10	30	20	150	2	1	2	4
4.	160503	DC	Theory of Computation (DC-10)	70	20	10	30	20	150	2	1	2	4
5.	160504	DC	Microprocessor & Interfacing (DC-11)	70	20	10	30	20	150	2	1	2	4
6.	160505	DLC	Minor Project-I** (DLC-3)	-	-	-	30	20	50	-	-	2	1
7.	160506	DLC	Summer Internship Project-II (Evaluation) (DLC-4)	-	-	-	25	-	25	-	-	6	3
8.	160507	SEMINAR/ SELF STUDY	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	25	25	-	-	2	1
Total				350	100	50	145	105	750	12	4	16	24
9.	100006$	MC	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	03
Department level activity/workshop/awareness programme to be conducted; certificate of compliance to be submitted by HoD to the Exam Controller through Dean Academics													
Additional Course for Honours or minor Specialization			Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization										

* Group A/B programmes will offer this course in V/VI Semester respectively.

$ Group A/B programmes will offer this course in V/VI Semester respectively. (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

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

GROUP A: (Electrical, Electronics, Computer Science & Engineering, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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

Honours* *(to be opted by students of Parent Department)*	
IT0520H1	Introduction to Internet of Things (12 week)
IT0519H2	Data Science for Engineers (8 Week)
IT0519H3	The Joy of Computing using Python (12 Week)

DOMAIN SPECIFIC COURSES FOR MINOR SPECIALIZATION*

Domain 1: Programming*	
Course Code	**Course Name**
IT0521M1	Programming, Data Structures and Algorithms in Python
IT0521M2	Programming in Java

Domain 2: Systems*	
Course Code	**Course Name**
IT0519M1	Operating System Fundamentals
IT0521M3	Introduction to Internet of Things

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B.Tech. VI Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End Sem.	Mid Sem Exam.	Quiz/ Assign ment	End Sem.	Lab work & Sessional	Assign ment	Exam		L	T	P	
1.	160601	DC	Compiler Design (DC-12)	70	20	10	30	20	-	-	150	2	1	2	4
2.	160602	DC	Computer Networks (DC- 13)	70	20	10	-	-	-	-	100	4	-	-	4
3.	DE	DE	Departmental Elective (DE-1)	70	20	10	-	-	-	-	100	4	-	-	4
4.	DE	DE	Departmental Elective* (DE-2)	-	-	-	-	-	25	75	100	4	-	-	4
5.	OC	OC	Open Category (OC-1)	70	20	10	-	-	-	-	100	3	-	-	3
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	-	-	100	3	-	-	3
7.	160603	DLC	Minor Project-II (DLC-5)	-	-	-	50	50	-	-	100	-	-	4	2
Total				**350**	**100**	**50**	**80**	**70**	**25**	**75**	**750**	**20**	**01**	**06**	**24**
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**												

DE -1 (Through Traditional Mode)		
S. No.	Subject Code	Subject Name
1.	160611	Network & Web Security
2.	160613	Agile Methodology
3.	160614	Cloud Computing

DE -2*		
S. No.	Subject Code	Subject Name
1.	160651	Data Analytics with Python
2.	160652	Introduction to Machine Learning
3.	160654	Artificial Intelligence: Knowledge Representation And Reasoning

OC-1		
S. No.	Subject Code	Subject Name
1.	900108	Software Engineering
2.	900116	Data Mining & Warehousing
3.	900119	Robotics & Vision Control

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Honours* *(to be opted by students of Parent Department)*	
Course Code	**Course Name**
IT0620H2	GPU Architectures and Programming (12 Weeks)
IT0622H1	Advanced Computer Architecture (8 Weeks)
IT0621H2	Introduction to Industry 4.0 and Industrial Internet of Things (12 Weeks)

DOMAIN SPECIFIC COURSES FOR MINOR SPECIALIZATION

Domain 1: Programming*	
Course Code	**Course Name**
IT0622M1	Object Oriented System Development using UML, Java and Patterns (8 Weeks)
IT0622M2	Cloud computing (12 Weeks)

Domain 2: Systems*	
Course Code	**Course Name**
IT0622M3	Computer Networks and Internet Protocol (12 Weeks)
IT0622M4	Introduction to Database Systems (12 Weeks)

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B. Tech. VII Semester (Information Technology)

(For batch admitted in Academic Session 2019-20)

S. No.	Subject Code	Category	Subject Name & Title	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits
				Theory Slot			Practical Slot		MOOCs						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Assignment	Exam		L	T	P	
1.	DE	DE	Departmental Elective (DE-3)	70	20	10	-	-	-	-	100	3	-	-	3
2.	DE	DE	Departmental Elective* (DE-4)	-	-	-	-	-	25	75	100	3	-	-	3
3.	OC	OC	Open Category (OC-2)	70	20	10	-	-	-	-	100	2	1	-	3
4.	OC	OC	Open Category (OC-3)	70	20	10	-	-	-	-	100	3	-	-	3
5.	100008	MC	Intellectual Property Rights (IPR) (MC)	70	20	10	-	-	-	-	100	2	-	-	2
6.	160701	DLC	Departmental Lab (DLC-6)	-	-	-	50	50	-	-	100	-	-	2	1
7.	160702	DLC	Summer Internship Project-III (04 weeks) (Evaluation) (DLC-7)	-	-	-	50	50	-	-	100	-	-	4	2
8.	160703	DLC	Creative Problem Solving (Evaluation) (DLC-8)	-	-	-	25	25	-	-	50	-	-	2	1
Total				280	80	40	125	125	25	75	750	13	1	8	18
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											

DE -3 (Through Traditional Mode)

S. No.	Subject Code	Subject Name
1.	160714	Data Mining & Predictive Modelling
2.	160715	Soft Computing
3.	160716	Mobile Computing

DE -4*

S. No.	Subject Code	Subject Name
1.	160752	Scalable Data Science (8 Week)
2.	160754	Social Networks (12 Week)
3.	160756	Big Data Computing (8 Week)

OC-2

S. No.	Subject Code	Subject Name
1.	900208	Soft Computing

OC-3

S. No.	Subject Code	Subject Name
1.		Analytics Using R Programming

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

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

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

Honours* *(to be opted by students of Parent Department)*	
Course Code	**Course Name**
160721H1	Computer Vision (12 Week)
IT0720H2	Deep Learning (12 Week)
160721H2	Distributed Systems (8 Week)

DOMAIN SPECIFIC COURSES FOR MINOR SPECIALIZATION

Domain 1: Programming*	
Course Code	**Course Name**
IT0721M1	Introduction to Machine Learning (12 Week)
IT0722M1	Data Science for Engineers (8 Week)

Domain 2: Systems*	
Course Code	**Course Name**
IT0722M2	Real-Time Systems (12 Week)
IT0722M3	MultiCore Computer Architecture-Storage and Interconnects (8 Week)

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - II

Syllabi
of
Departmental Elective (DE) Courses
B.Tech VII Semester
(Batch Admitted in 2019-20)
(Information Technology)
Under Flexible Curriculum

[ITEM IT-3]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

DATA MINING & PREDICTIVE MODELLING
160714 (DE-3)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To learn, how to develop models to predict categorical and continuous outcomes, using various models.

Unit - I

Introduction: Data Mining Process, KDD Process Model, Functions of Data Mining, Applications of Data Mining. Data Warehouse and its Architecture.

Data Preparation: Data Exploration, Data Quality, Missing Values, Data Types and Conversion, Transformation, Outliers, Feature Selection, Data Sampling.

Unit - II

Association Rules: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, FP-Growth Algorithm, Partitioning Algorithms.

Unit - III

Regression & Classification: Overview of supervised learning, Linear regression models, Multiple Regression, Subset Selection, Linear Discriminant Analysis, Logistic Regression.

Introduction to Classification, Decision Trees, Rule Induction, K-Nearest Neighbors, Naïve Bayesian, Artificial Neural Networks, Support Vector Machines.

Unit – IV

Unsupervised Learning: Clustering, Major Clustering Methods: Partitioning Algorithms- K-Means, Hierarchical Algorithms, real life example of clustering.

Unit - V

Model Assessment and Selection: Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques. A. K. Pujari, Universities Press Pvt. Ltd.
- Applied Predictive Analytics Principles and Techniques for the Professional Data Analyst, Wiley Publications 2014.
- An Introduction to Statistical Learning with Applications in R, Gareth James, Daniela Witten et. al., Springer, 2015.

COURSE OUTCOMES

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

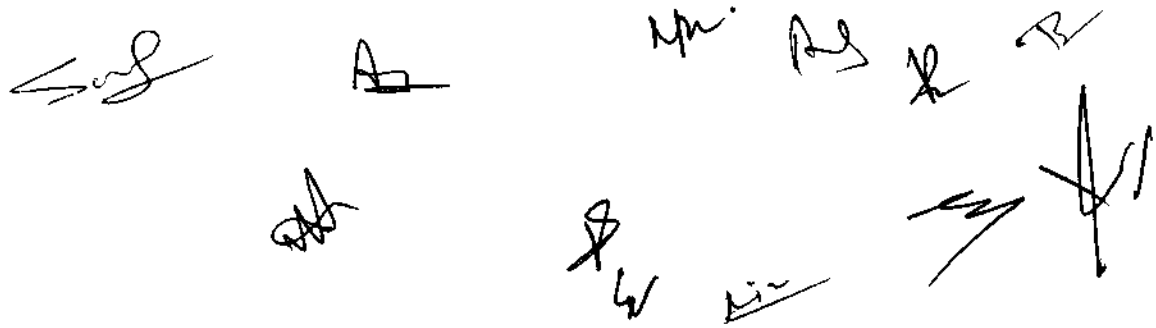
CO1. define the key processes of data mining.

CO2. identify the basic principles and algorithms used in practical data mining.

CO3. compare the underlying predictive modeling techniques.

CO4. select appropriate predictive modelling approaches to identify cases to progress with.

CO5. develop different supervised and unsupervised learning.



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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING
160715 (DE-3)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

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

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised learning.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MOBILE COMPUTING
160716 (DE-3)

COURSE OBJECTIVES

- To introduce the basic concepts and principles in mobile computing.
- To provide a computer systems perspective on the converging areas of wireless networking, mobile devices, and network protocols.
- To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

Unit-I

Review of Personal Communication Services (PCS): Basic Concepts of Cellular Systems, Global System for Mobile Communication (GSM), Protocols, Handover, Data Services, and Multiple Division Techniques.

Unit-II

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 Standard. Mobile IP.

Unit-III

Wireless Application Protocol (WAP): Mobile Internet Standard. WAP Gateway and Protocols, Wireless Markup Languages (WML).

Unit-IV

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of Services in 3G.

Unit-V

Wireless Local Loop (WLL): Introduction to WLL Architecture, WLL Technologies. Global Mobile Satellite Systems: Case Studies of IRIDIUM and GLOBALSTAR Systems. Bluetooth Technology, Wi-Fi and Wi-Max.

RECOMMENDED BOOKS

- Mobile communications, J. Schiller, Pearson Education.
- Wireless and Mobile Networks Architecture, by Yi —Bing Lin, John Wiley & Sons.
- Mobile & Personnel Communication Systems and Services, Raj Pandya, Prentice Hall India.

- Wireless Communication- Priciples and Practices. Theodore S. Rappaport, Pearson Education.
- The Wireless Application Protocol, Singhal & Bridgman, Pearson Education.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the basic concepts of mobile telecommunications system.

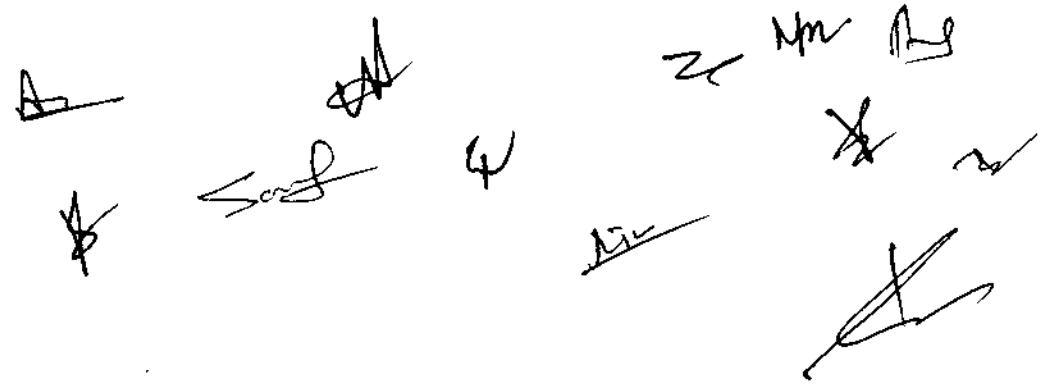
CO2. demonstrate the infrastructure to develop mobile communications system.

CO3. classify the different generations and technology for mobile communications.

CO4. examine the working of different protocols of wireless mobile communication technology.

CO5. determine the importance of each technology suitable for different situation of mobile and wireless communications.

CO6. develop protocols for adhoc and infrastructure based wireless networks.



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE- III

Syllabi of Open Category (OC) Courses offered by Department of IT in B.Tech VII Semester (Batch Admitted in 2019-20) Under Flexible Curriculum

[ITEM IT- 5]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING
900208 (OC-2)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background. Traditional optimization and Search Techniques. Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system (ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

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

CO1. define basic concepts of neural network and fuzzy systems.

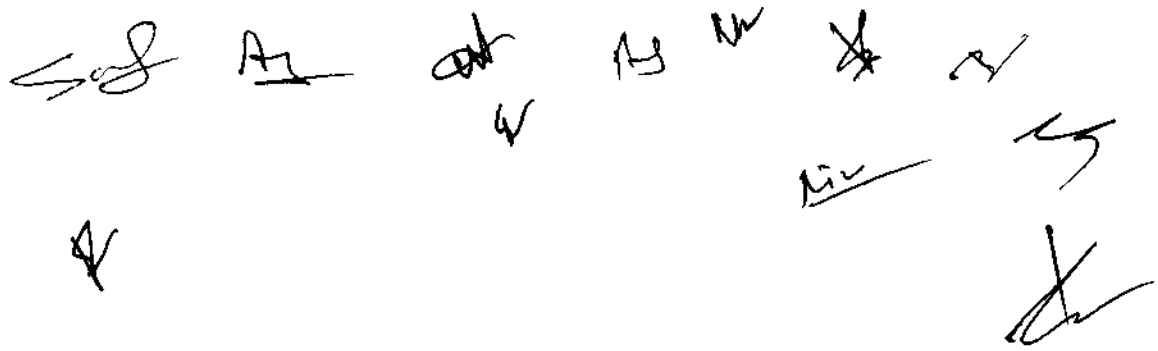
CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised learning.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANALYTICS USING R PROGRAMMING
900227 (OC-3)

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: Basic Syntax in R Programming, Packages, Comments in R, Operators, Keywords, Datatypes, Variables, Input/Output, Control Flow.

Unit-II

Functions: Types of function in R Language, Recursive Functions, Conversion Functions. **Data Structures:** String, Vector, Lists, Array, Matrices, Factors, Data Frames.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Data Munging, Importing Data, Exporting Data.

Unit-IV

Analysis & Modeling: Time Series Analysis, Classification, Regression, and Machine Learning: Supervised and Unsupervised Learning.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

COURSE OUTCOMES

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

CO1. define basic programming constructs used in R.

CO2. explain the various commands used in R.

CO3. apply various concept of programming for controlling the flow of data using R.

CO4. analyze the concept of concept of object oriented programming in R.

CO5. choose appropriate packages of R programming for dealing various tasks.

CO6. predict results from the datasets using R commands.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - IV

Experiment list/ Lab manual of B. Tech VII Semester (Batch Admitted in 2019-20) (Information Technology) Under Flexible Curriculum

[ITEM IT -6]

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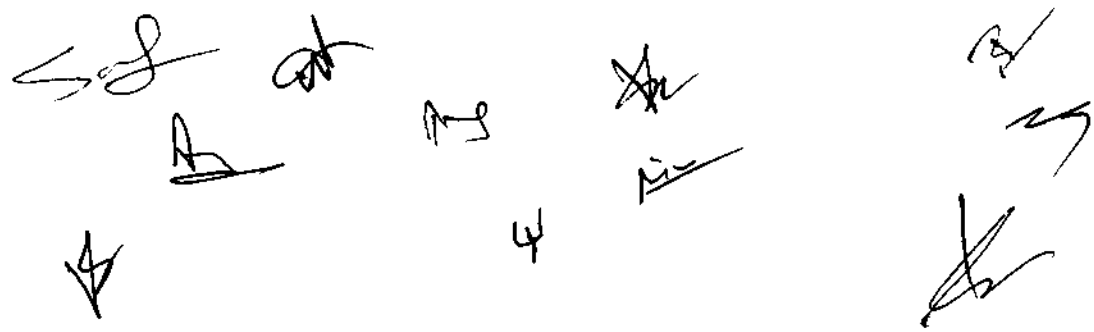
DEPARTMENT OF INFORMATION TECHNOLOGY

INTERNET OF THINGS (IoT)

LIST OF PROGRAMS

1. Introduction to ARM/ RaspberryPi Boards (Installation and Setup).
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and print the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect objects using IR Obstacle Sensor.
8. Write a program to detect the presence of Gas using a GAS Sensor.
9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
11. Write a program to detect motion using Motion Sensor (PIR sensor).
12. Write a Program to detect presence of smoke using Smoke Sensor.
13. Write a program to interface a range sensor with an arduino board and understand the principle behind an ultrasonic range sensor.
14. Write a program to interface DHT11 and Range sensor using a single board.
15. Write a program to show sensor data (DHT11, Time, Message, Countdown) on LCD Display.
16. Write a program to demonstrate MQTT- Publish/ Subscribe concept using IoT Device.
17. Write a program to demonstrate the concept of MQTT- Broker using IoT Device.
18. Write a program to send and receive messages to IoT Devices using MQTT.
19. Write a program to demonstrate different IoT Protocols STOMP, DDS, XMPP, SSE, LwM2M or Lightweight M2M, LPWAN, CoAP, Bluetooth and WiFi etc.



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - V

Scheme
of
B. Tech V Semester
(Batch Admitted in 2020-21)
(Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics)
Under Flexible Curriculum

[ITEM IT -8]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100025	BSC	Engineering Mathematics-II	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	160311	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
3.	160312	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
4.	160313	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
5.	160314	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	160315	DLC	Java Programming Lab					60	20	20	100			2	2	Offline	SO
7.	160316	DLC	Self-Learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40		40			2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50		-	2	1	Interactive	SO
9.	160317	DLC	Summer Internship Project I (Institute Level) (Evaluation)	-	-	-	-	60			60			4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	12	4	14	23	-	-
10.	1000002	MAC	Biology for Engineers	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

*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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory		Lab		NEC	Total Credits
Offline	Online	Blended Offline	Blended Online	Offline	Interactive	PP	AO	MCQ	SO	SO	
04	-	08	04	06	01	15	-	-	07	01	23
17.39%	-	34.78%	17.39%	26.09%	4.35%	65.22%	-	-	30.43%	4.35%	Credits

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Scheme of Examination

GROUP Y: I Semester

B. Tech. I Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per Week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	230102	DC	Introduction to Computer Programming	60	20	20	60	20	20	200	2	1	2	4	AO
2.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	20	20	200	2	1	2	4	MCQ
3.	100020	ESC	Basic Civil Engineering & Mechanics	60	20	20				100	2	1	-	3	PP
4.	100021	ESC	Basic Mechanical Engineering	60	20	20	-	-	-	100	2	1	-	3	MCQ
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	-	100	3	-	-	3	MCQ
6.	160111	DLC	IT workshop	-	-	-	60	20	20	100	-	-	4	2	A+O
			Total	300	100	100	180	60	60	800	11	04	08	19	

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.

NSS / NCC — Qualifier

GROUP X: (Civil, Mechanical, Electrical, Chemical, and Automobile)

GROUP Y: (Electronics, Computer Science& Engineering, Information Technology,Electronics & Telecommunication)

01Theory Period=1 Credit; 02 Practical Periods =1 Credit

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

15/01/2021

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Scheme of Examination

GROUP Y: II Semester

B. Tech. II Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per Week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem.	Quiz/ Assign ment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	100011	BSC	Engineering Mathematics –I	60	20	20	-	-	-	100	3	1	-	4	PP
2.	160211	DC	Data Structures	60	20	20	60	~~40~~ 20	20	200	2	1	2	4	PP
3.	160212	DC	Object Oriented Programming & Methodology	60	20	20	60	20	20	200	3	-	2	4	AO
4.	160213	DC	Digital Electronics	60	20	20	-	-	-	100	2	1		3	PP
5.	100016	HSMC	Technical Language	60	20	20	-	-	-	100	3	-	-	3	PP MCQ
6.	100017	HSMC	Language Lab	-	-	-	60	~~40~~ 20	~~20~~	100	-	-	2	1	
			Total	300	100	100	180	100	20	800	13	03	06	19	-
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.															
NSS / NCC			Qualifier												

GROUP X: (Civil, Mechanical, Electrical, and Automobile)

GROUP Y: (Electronics,Computer Science& Engineering, Information Technology, Electronics & Telecommunication, Chemical)

01Theory Period=1 Credit; 02 Practical Periods =1 Credit

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

15/11/2021

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Department of Information Technology

Scheme of Evaluation

B. Tech. IV Semester (Information Technology)

For batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam	Proficiency in subject course	Mid Sem. Exam	Quiz Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100003	BSC	Engineering Mathematics III	50	10	20	20		-		100	2	1	-	3	Offline	PP
2.	160411	DC	Computer Graphics & Multimedia	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	160412	DC	Software Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	160413	DC	Computer Networks	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	100004	MC	Cyber Security	50	10	20	20	-	-	-	100	2	-	-	2	Online	MCQ
6.	160414	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO
7.	200XXX	CLC	Novel [illegible] Course Information [illegible]	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
			Total	**250**	**50**	**100**	**100**	**230**	**60**	**60**	**850**	**10**	**5**	**8**	[illegible]	-	-
8.	1000001	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

[1] 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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	NEC	[illegible]
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	NO	SO	
		Offline	Online								
04	02	06	03	03	01	09		05	04	01	19
21.05%	10.5[illegible]%	[illegible]	15.79%	15.79%	[illegible]	[illegible]		[illegible]	[illegible]	5.26%	Credits %

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Department of Information Technology

Scheme of Evaluation

B. Tech. V Semester (IT)

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	160511	BSC	Discrete Structures	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	160512	DC	Data Science using Python	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
3.	160513	DC	Theory of Computation	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
4.	160514	DC	Microprocessor & Interfacing	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
5.	160515	DC	Soft Computing Techniques	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	160516	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO
7.	160517	Mandatory Self Study	Training/Presentation (SWAYAM/NPTEL/MOOC)*	-	-	-	-	-	50	-	50	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	160518	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	350	140	60	1050	14	02	18	[redacted]	-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
11.	1000006	MAC	Disaster Management	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
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

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

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

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
04	-	08	04	08	01	13	-	03	08	01	25
16.00%	-	32.00%	16.00%	32.00%	4.00%	52.00%	-	12.00%	32.00%	4.00%	Credits %

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Scheme of Examination

B.Tech. in Internet of Things (IoT) (Offered by Department of Information Technology)

I Semester

For batches admitted in Academic Session 2020-21 Onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	230101	DC	Introduction to Internet of Things (IoT)	60	20	20	-	-	-	100	4	-	-	4	MCQ
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	20	20	200	2	1	2	4	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	20	20	200	2	1	2	4	MCQ
4.	250100	BSC	Linear Algebra	60	20	20	-	-	-	100	3	1	-	4	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	-	100	3	-	-	3	MCQ
Total				300	100	100	120	40	40	700	14	03	04	19	-
NSS/NCC				Qualifier											

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

MCQ: Multiple Choice Questions; AO: Assignment + Oral; OB: Open Book ; PP: Pen Paper

15/12/21

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Scheme of Examination

B.Tech.in Internet of Things (IoT) (Offered by Department of Information Technology)

II Semester

For batches admitted in Academic Session 2020-21 Onwards

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	230201	DC	Digital Logic Design	60	20	20	-	-	-	100	2	1	-	3	PP
2.	220202	DC	Sensor Technology	60	20	20	60	20	20	200	3	-	2	4	PP
3.	230202	DC	Data Structures	60	20	20	60	~~40~~ 20	20	200	3	-	2	4	PP
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	60	20	20	200	3		2	4	PP
5.	100016	HSMC	Technical Language	60	20	20	-	-		100	3	-	-	3	~~MCQ~~ PP
6.	100017	HSMC	Language Lab	-	-	-	60	~~40~~ 20	20	100	-	-	2	1	AO
Total				300	100	100	240	120	40	900	14	1	8	19	-
NSS/NCC				Qualifier											
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)															

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

15/01/2021

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Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT)

III Semester

for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: *Proficiency in subject course	Theory Slot: Continuous Evaluation: Mid Sem. Exam.	Theory Slot: Continuous Evaluation: Quiz/ Assignment	Practical Slot: End Sem. Exam.	Practical Slot: Continuous Evaluation: Lab work & Sessional	Practical Slot: Continuous Evaluation: Skill Based Mini Project	Total Marks	Contact Hours per week: L	T	P	Total Credits	Mode of Teaching (Offline Online)	Mode of Exam.
1.	250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	230301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	230302	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
4.	230303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
5.	230304	DC	Database Management System	50	10	20	20	60	20	20	200	3		2	4	Blended (2/1)	PP
6.	230305	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-		2	1	Offline	SO
7.	230306	DLC	Self learning Presentation (SWAYAM/NPTEL MOOC)	-	-	-	-	-	40	-	40	-		2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engineering Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	230307	DLC	Summer Internship Project I (Institute Level)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
			Total	250	50	100	100	290	100	60	950	14	2	14	23	-	-
10.	100002	MAC	Training for Engineers	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

* 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 OB: Open Book PP: Pen Paper SO: Submission Oral

Mode of Teaching: Theory: Offline	Theory: Online	Theory: Blended: Offline	Theory: Blended: Online	Lab: Offline	NEC: Interactive	NEC: PP	Mode of Examination: Theory: A+O	Theory: MCQ	Lab: SO	NEC: SO	
04	-	08	04	06	01	16	-	-	06	01	33
17.39%	-	34.78%	17.39%	26.09%	[illegible]	69.56%			26.09%	4.35%	[illegible]

(ACADEMICS)

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GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT)

IV Semester

for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem Exam	Proficiency in subject course	Mid Sem Exam	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	230401	DC	Computer Architecture and Microprocessor	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
2.	230402	DC	Cloud Computing	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
3.	230403	DC	Software Engineering	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
4.	230404	DC	IoT Architecture and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
5.	230405	DC	Network & Web Security	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	230406	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				250	50	100	100	230	60	60	850	14	02	08	20	-	-
8.	1000001	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

* 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 AQ: Assignment – Quiz OB: Open Book PP: Pen Paper SO: Submission – Oral

Mode of Teaching						Mode of Examination				
Theory				Lab	NEC		Theory		Lab	NEC
Blended										
Offline	Online	Offline	Online	Offline	Interactive	PP	A+Q	MCQ	SO	SO
01		10	05	03	01	12		01	04	01
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]

DEAN (ACADEMICS)
MITS
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT) V Semester *(for batch admitted in academic session 2020 – 21)*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230501	BSC	Discrete Structures	50	10	20	20	-	-	-	100	2	1	-	3	[illegible]	[illegible]
2.	230502	DC	Data Sciences in IoT	50	10	20	20	60	20	20	200	3	-	2	4	[illegible]	[illegible]
3.	230503	DC	Theory of Computation	50	10	20	20	60	20	20	200	2	1	2	4	[illegible]	[illegible]
4.	230504	DC	Embedded System & IoT	50	10	20	20	60	20	20	200	3	-	2	4	[illegible]	[illegible]
5.	230505	DC	Soft Computing Techniques	50	10	20	20	-	-	-	100	3	-	-	3	[illegible]	PP
6.	230506	DLC	Minor Project-I**	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO
7.	230507	Seminar/ Self-Study	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)*	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	230508	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
			Total	250	50	100	100	350	140	60	1050	13	02	18		-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
11.	1000006	MAC	Disaster Management	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
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

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

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

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
03	-	08	04	08	01	12	-	03	08	01	24
12.50%	-	33.33%	16.67%	33.33%	4.17%	50.00%	-	12.50%	33.33%	04.17%	Credits %

(ACADEMICS)
M.I.T.S
GWALIOR

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. in Information Technology (Artificial Intelligence and Robotics)

(Offered by Department of Information Technology)

I Semester

For batches admitted in Academic Session 2020-21 Onwards

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem Exam.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	240101	DC	Introduction to Artificial Intelligence	60	20	20	-	-	-	100	4	-		4	MCQ
2.	230102	DC	Introduction to Computer Programming	60	20	20	60	20	20	200	2	1	2	4	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	60	20	20	60	20	20	200	2	1	2	4	MCQ
4.	250100	BSC	Linear Algebra	60	20	20	-	-	-	100	3	1	-	4	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	60	20	20	-	-	-	100	3	-	-	3	MCQ
			Total	300	100	100	120	40	40	700	14	3	04	19	-
			NSS/NCC	Qualifier											

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

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

15/01/2021

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Scheme of Examination

B.Tech. in Information Technology (Artificial Intelligence and Robotics)

(Offered by Department of Information Technology)

II Semester

For batches admitted in Academic Session 2020-21 Onwards

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Exam
				Theory Slot			Practical Slot								
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work & Sessional	Skill Based Mini Project		L	T	P		
1.	230201	DC	Digital Logic Design	60	20	20	-	-	-	100	2	1	-	3	PP
2.	220202	DC	Sensor Technology	60	20	20	60	20	20	200	3	-	2	4	PP
3.	230202	DC	Data Structures	60	20	20	60	~~40~~ 20	~~-~~ 20	200	3	-	2	4	PP
4.	230203	DC	Object Oriented Programming and Methodology	60	20	20	60	20	20	200	3	-	2	4	AO
5.	100016	HSMC	Technical Language	60	20	20	-	-	-	100	3	-	-	3	~~MCQ~~ PP
6.	100017	HSMC	Language Lab	-	-	-	60	~~40~~ 20	~~-~~ 20	100	-	-	2	1	AO
Total				300	100	100	240	120	40	900	14	1	8	19	-
NSS/NCC				Qualifier											
Summer Internship Project –I (Institute Level) (Qualifier): Minimum two-week duration (Evaluation in III Semester)															

MCQ: Multiple Choice Question; **AO:** Assignment + Oral; **OB:** Open Book ; **PP:** Pen Paper

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15/01/2021

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

III Semester

for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted								Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot					Practical Slot			L	T	P			
				End Term Evaluation		Continuous Evaluation			Continuous Evaluation								
				End Sem Exam	Proficiency in subject course*	Mid Sem. Exam	Quiz/ Assignment	End Sem. Exam.	Lab Work & Sessional	Skill Based Mini Project	Total Marks						
1.	250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	240301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	240302	DC	Operating System	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
4.	240303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
5.	240304	DC	Database Management System	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
6.	250305	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	240306	DLC	Self learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40			2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	240307	DLC	Summer Internship Project I (Industry/ Research)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	14	2	14	23	-	-
10.	[illegible]	MAC	Biology for Engineers	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

*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 OB: Open Book PP: Pen Paper SO: Submission - Oral

Mode of Teaching					Mode of Examination				
Theory			Lab	NEC	Theory			Lab	NEC
Offline	Online	Blended Offline	Blended Online	Offline	Interactive	PP	A+O	MCQ	SO	SO
04		08	04	06	01	16	-	-	06	01
[illegible]		33.3%	17.39%	26.09%	[illegible]	[illegible]			26.09%	[illegible]

(ACADEMICS)

M.I.T.S. GWALIOR

Department of Information Technology
Scheme of Evaluation
B. Tech. in Information Technology (Artificial Intelligence and Robotics)
IV Semester

for batches admitted in academic session 2020 – 21 onwards

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam	[b]Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment		Lab Work & Sessional	Skill Based Mini Project							
1.	240401	DC	Computer Architecture and Microprocessor	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
2.	240402	DC	Cloud Computing	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
3.	240403	DC	Software Engineering	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
4.	240404	DC	Machine Learning and Optimization	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
5.	240405	DC	Network & Web Security	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	240406	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	200XXX	[illegible]	Novel Engaging Course [illegible] (Informal Learning)	[illegible]	[illegible]	[illegible]	[illegible]	50	[illegible]	[illegible]	50	[illegible]	[illegible]	02	1	Interactive	SO
Total				250	50	100	100	290	80	80	950	14	01	10	[illegible]	-	-
8.	1000001	MAC	Indian Constitution and Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester																	

[b] 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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
-	-	10	05	04	01	12	-	03	04	01	20
-	[illegible]	[illegible]	[illegible]	20.00%	5.00%	60%	-	15.00%	20.00%	5.00%	Credits %

MITS
GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

V Semester

(for batch admited in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	240501	BSC	Discrete Structures	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	240502	DC	Data Science using Python	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	MCQ
3.	240503	DC	Theory of Computation	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
4.	240504	DC	Robotics System and Control	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
5.	240505	DC	Soft Computing Techniques	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	240506	DLC	Minor Project-I **	-	-	-	-	60	40	-	100	-	-	4	2	Offline	SO
7.	240507	Seminar/ Self-Study	Self-learning/Presentation (SWAYAM/NPTEL/ MOOC)#	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	240508	DLC	Summer Internship Project-II (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	350	140	60	1050	13	02	18	24	-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
11.	1000006	MAC	Disaster Management	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ
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

** The minor project-I may be evaluated by an internal committee for awarding sessional marks.

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

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
03	-	08	04	08	01	12	-	03	08	01	24
12.50%	-	33.33%	16.67%	33.33%	4.17%	50.00%	-	12.50%	33.33%	04.17%	Credits %

04/09/2022

DEAN (ACADEMICS)

M.I.T.S

GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - VI

Syllabi of Departmental Core (DC) Courses B.Tech V Semester (Batch Admitted in 2020-21) (Information Technology/ Internet of Things (IoT/ Artificial Intelligence and Robotics) Under Flexible Curriculum

[ITEM IT - 9]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Batch Admitted in 2020-21)
(Information Technology)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DISCRETE STRUCTURES
160511

L	T	P	Total Credits
3	1	-	4

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

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Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional 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-III

Introduction and Basic Terminology of Graphs, Planner Graphs, 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-IV

Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations With Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring, Integral Domain and Field.

RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science. Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition).2006. McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics. 2008. Tata McGraw-Hill.
- T. Koshy: Discrete mathematics with applications.2003. Academic Press.
- J. Hein: Discrete structures, logic and computability.2009. Jones & Bartlett Publishers.

COURSE OUTCOMES

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

CO1. explain the basic concept of set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure.

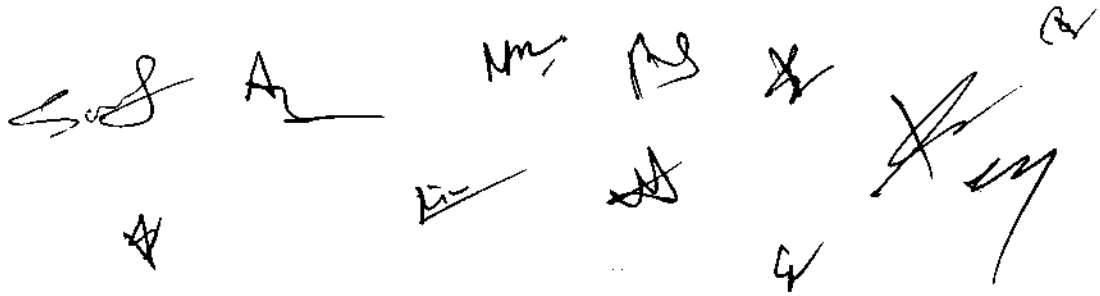
CO2. illustrate the knowledge of course content and distinguish between them in terms of their applications.

CO3. identify the concepts of graph and tree for solving problems in the computer science.

CO4. apply the concepts of studied topics with suitable technique faced in engineering problems

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

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



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
160512

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

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

Unit-I

Basics of Python Tool, Introduction to Data Science. Various Fields of Data Science, Impact of Data Science, Data Analytics Life Cycle. Data Science Toolkit, Version Controlling.

Unit-II

Understanding data, Types of data: Numeric, Categorical, Graphical, High Dimensional Data, Classification of Digital Data: Structured, Semi-Structured and Unstructured, Source of Data: Time Series, Transactional Data, Biological Data, Special Data, Social Network Data, Data Evolution.

Unit-III

Data Acquisition and Data wrangling: Accessing Database, CSV and JSON Data, Data Cleaning and Transformation using Pandas and Sklearn, Data Visualization, Missing Value Analysis, Correction Matrix, Outlier Detection Analysis, Feature Engineering.

Unit -IV

Descriptive Statistics: Measures of Center and Spread, Estimation Distributions, Inferential Statistics: Sampling Distributions. Hypothesis Testing, Probability Theory, Conditional Probability, Maximizing and Minimizing Algebraic Equations, Matrix Manipulation and Multiplication.

Unit -V

Supervised Learning: Regression, classification, decision trees, random forest, Unsupervised Learning: PCA, Clustering. Application of Data Science, Use Case:

Consumer Product usage Analysis, Search Engines, Targeting Recommendation, Gaming etc.

RECOMMENDED BOOKS

- Introduction to linear algebra - by gilbert strang
- Applied statistics and probability for engineers – by douglas montgomery
- Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing, and Presenting Data – EMC Education
- Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython – Wes McKinney.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define the fundamentals of data science and its importance.

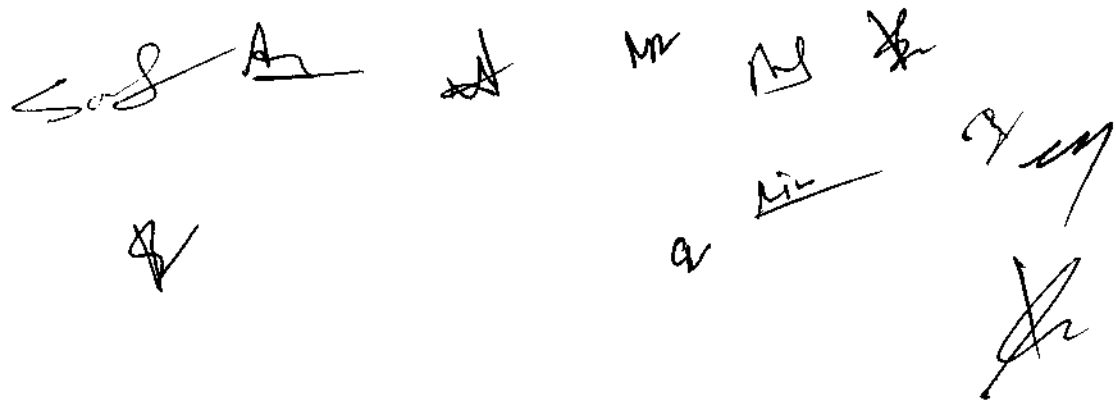
CO2. contrast the basics of python and libraries related to data science

CO3. classify different types of data analytics

CO4. organize the data collected from various sources

CO5. analyze pre-processing and data reduction strategies.

CO6. create the graphical representation of the data through visualization tool on various applications.



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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
160513

L	T	P	Total Credits
2	1	2	4

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 of Automata Theory: 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. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

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.

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. analyze 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 INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACING
160514

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

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

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

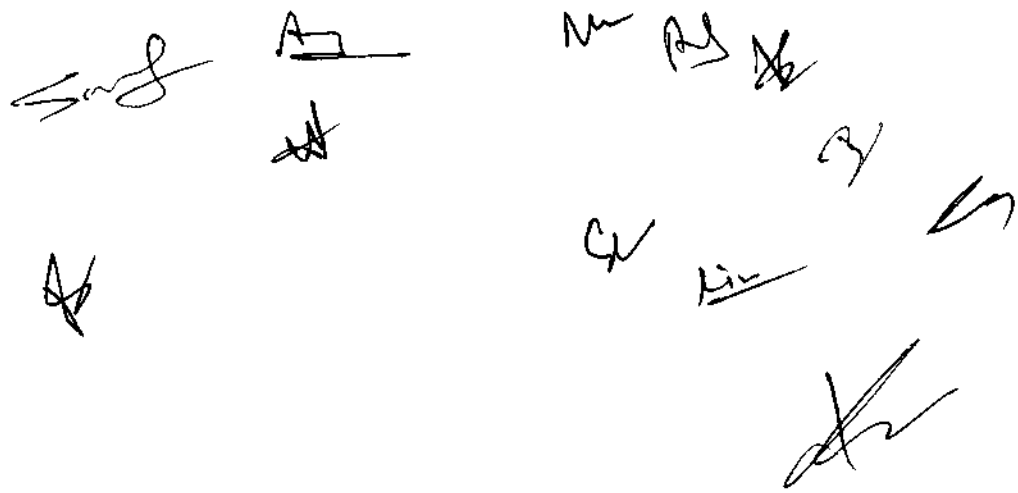
CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING TECHNIQUES
160515

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction to Soft Computing: Soft Computing v/s Hard Computing, Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, Supervised Learning Networks: Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, Defuzzification: Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-III

Evolutionary Algorithm: Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-IV

Introduction to Nature-Inspired Optimization Algorithms: Particle Swarm Optimization (PSO) Algorithm, Differential Evolution (DE) Algorithm, Artificial Bee

Colony (ABC) Algorithm, Ant Colony Optimization (ACO) Algorithm, Cuckoo Search (CS), Firefly Algorithm (FA). Immune Algorithm (IA), Grey Wolf Optimization (GWO), Spider Monkey Optimization.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH.
- Evolutionary Optimization Algorithms, D. Simon (2013), Wiley.
- Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications, L. N. de Castro (2006), CRC Press.

COURSE OUTCOMES

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

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised learning.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Batch Admitted in 2020-21)
(Internet of Things (IoT))
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DISCRETE STRUCTURES
230501

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

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Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional 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-III

Introduction and Basic Terminology of Graphs, Planner Graphs, 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-IV

Introduction to Discrete Numeric Functions and Generating Functions, Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring, Integral Domain and Field.

RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science. Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition).2006. McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics. 2008. Tata McGraw-Hill.
- T. Koshy: Discrete mathematics with applications.2003. Academic Press.
- J. Hein: Discrete structures, logic and computability.2009. Jones & Bartlett Publishers.

COURSE OUTCOMES

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

CO1. explain the basic concept of set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure.

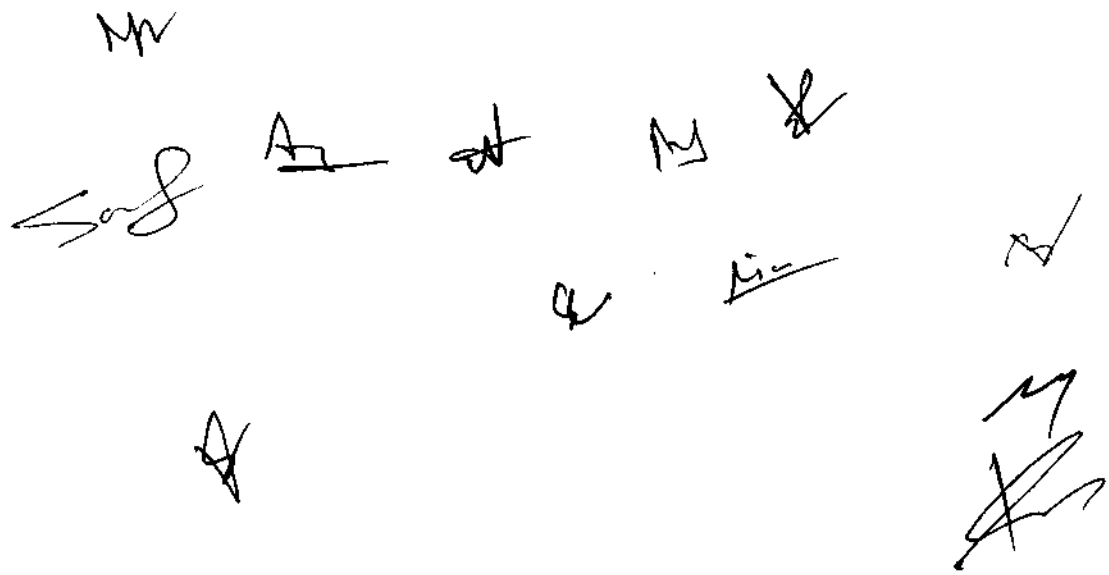
CO2. illustrate the knowledge of course content and distinguish between them in terms of their applications.

CO3. identify the concepts of graph and tree for solving problems in the computer science.

CO4. apply the concepts of studied topics with suitable technique faced in engineering problems.

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

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



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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCES IN IOT
230502

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the key technologies in analytics for IoT.
- To understand the IoT data and requirement of analysis.
- To gain practical, hands-on experience with statistics programming languages, tools.

Unit-I

Introduction to Data Analytics: Defining IoT Analytics and Challenges: The situation, Defining IoT analytics, IoT analytics challenges, Business value concerns, IoT Analytics for the Cloud. Types of Analytics: Streaming Analytics. Spatial, Time Series and Prescriptive Analytics.

Unit-II

Data Collection: Getting to know your data, Types of Data, Data collection strategies, Data Pre-processing, Feature engineering with IoT data, Exploratory Data Analytics, Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis.

Unit-III

Data Visualization and Representation: Model Development Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making, Box Plots, Pivot Table, Heat Map.

Unit-IV

Strategies to Organize Data for Analytics: Linked Analytical Datasets, Linking together datasets, Managing data lakes, Data retention strategy. Economics of IoT Analytics, Cost considerations for IoT analytics, Thinking about revenue opportunities, The economics of predictive maintenance example, Data Analytics Life Cycle.

Unit-V

Application of Analytics in IoT: IoT based applications, Healthcare, Marketing, Finance, Smart cities, Cyber security, video surveillance, Agriculture and Weather Forecasting and other domains; Real Time IoT based data analysis.

RECOMMENDED BOOKS:

- Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016.
- Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.
- David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
- Andrew Minteer, Analytics for the Internet of Things "IoT" (1 ed.), Packt Publishing. 2017. ISBN 978-1787120730.
- Hwaiyu Geng, Internet of Things and Data Analytics Handbook (1st st ed.), Wiley, 2017. ISBN 978-1119173649.

COURSE OUTCOMES

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

CO1. define the fundamentals of data science and its importance.
CO2. classify the evolution, roles, stages in data science projects.
CO3. analyze the pre-processing and data reduction strategies.
CO4. explain the different data visualization and representation techniques.
CO5. evaluate the performance of algorithms in data science.
CO6. design the different real time applications of data science in IoT.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
230503

L	T	P	Total Credits
2	1	2	4

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 of Automata Theory: 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. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

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.

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.

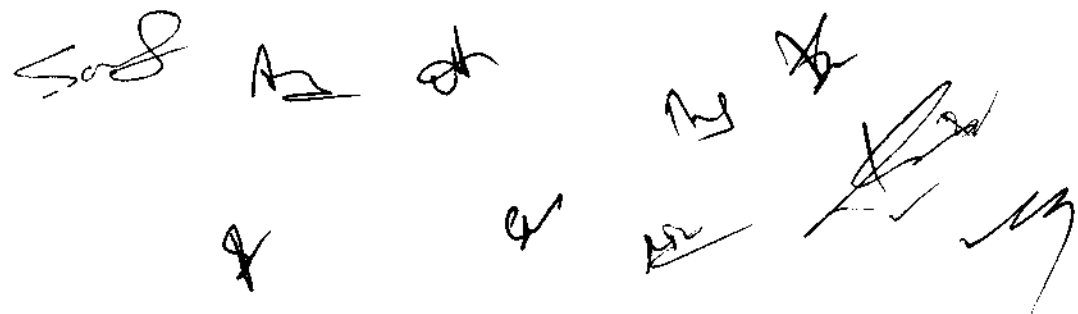
CO2. relate practical problems to languages, automata, computability and complexity.

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

CO4. analyze 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 INFORMATION TECHNOLOGY

EMBEDDED SYSTEM & IOT

230504

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To understand the concept of embedded system. microcontroller, different components of microcontroller and their interactions
- To learn ARM microcontrollers to perform various tasks.
- To understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.

Unit-I

Embedded and Microcontroller Concepts: Introduction to embedded processors, Application Areas, Categories of embedded processors, Hardware architecture, Software architecture, Application software, Communication software, Introduction to Harvard & Von Neumann Architectures, CISC & RISC Architectures.

Unit-II

Embedded Serial Communication: SPI, SCI (RS232, RS485), I2C, CAN, Field-bus (Profibus), USB. Communication under IoT: IoT Protocol: MQTT, CoAP, XMPP and AMQT, IoT Communication Models, IoT Communication Technologies: Bluetooth, BLE, Zig-Bee, Zwave, NFC, RFID, LiFi, Wi-Fi, Interfacing of Communication Technologies, Embedded Programming.

Unit-III

ARM: ARM design philosophy, data flow model and core architecture, registers, program status register, instruction pipeline, interrupts and vector table, operating modes and ARM processor families. Instruction Sets: Data processing instructions, addressing modes, branch, load, store instructions. PSR instructions, and conditional instructions.

Unit-IV

Raspberry Pi: Raspberry Pi board and its processor, Programming the Raspberry Pi, Communication facilities on Raspberry Pi (I2C, SPI, UART), Interfacing of sensors and actuators.

Unit-V

Intel Galileo or Edison microprocessors for Embedded System and IoT, Application-specific integrated circuit (ASIC), Application-specific standard parts (ASSPs), System-on-Chip (SoC), Field-Programmable Gate Arrays (FPGA), Single Board Computers (SBC).

RECOMMENDED BOOKS

- Muhammod Ali Mazidi, Rolin D. Mckinlay & Danny Sansey, "PIC Microcontroller and Embedded System SPI, UART using Assembly & C for PICI8," Pearson International Edition, 2008.
- A. N. Sloss, D. Symes, and C. Wright, "ARM System Developer's Guide: Designing and Optimizing System Software", Elsevier, 2008.
- S. Monk, "Programming the Raspberry Pi" McGraw-Hill Education, 2013
- John .B. Peatman, "Design with PIC Microcontroller", Prentice Hall, 1997.
- Steave Furber, "ARM system-on-chip architecture", Addison Wesley, 2000.

COURSE OUTCOMES

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

CO1. define the basic concepts of embedded systems and microcontroller.

CO2. explain the architecture and advanced features of embedded processors and microcontrollers.

CO3. utilize the PIC/ARM processor registers, instruction pipeline, interrupts and architecture.

CO4. examine the instructions, addressing modes, conditional instructions and programming of advanced embedded processors and microcontrollers.

CO5. analyze the architectures, instructions, interfacing and applications of Raspberry Pi board.

CO6. elaborate the advanced intel Galileo or Edison microprocessors for embedded systems for IoT.

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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING TECHNIQUES
230505

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction to Soft Computing: Soft Computing v/s Hard Computing, Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, Supervised Learning Networks: Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, Defuzzification: Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-III

Evolutionary Algorithm: Traditional optimization and Search Techniques. Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-IV

Introduction to Nature-Inspired Optimization Algorithms: Particle Swarm Optimization (PSO) Algorithm, Differential Evolution (DE) Algorithm, Artificial Bee

Colony (ABC) Algorithm, Ant Colony Optimization (ACO) Algorithm, Cuckoo Search (CS), Firefly Algorithm (FA), Immune Algorithm (IA), Grey Wolf Optimization (GWO), Spider Monkey Optimization.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
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- Evolutionary Optimization Algorithms, D. Simon (2013), Wiley.
- Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications, L. N. de Castro (2006), CRC Press.

COURSE OUTCOMES

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

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised learning.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
of
Departmental Core (DC) Courses
B.Tech V Semester
(Batch Admitted in 2020-21)
(Artificial Intelligence and Robotics)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DISCRETE STRUCTURES
240501

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

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Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional 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-III

Introduction and Basic Terminology of Graphs, Planner Graphs, 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-IV

Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations With Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring, Integral Domain and Field.

RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science. Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition).2006. McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics. 2008. Tata McGraw-Hill.
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COURSE OUTCOMES

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

CO1. explain the basic concept of set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure.

CO2. illustrate the knowledge of course content and distinguish between them in terms of their applications.

CO3. identify the concepts of graph and tree for solving problems in the computer science.

CO4. apply the concepts of studied topics with suitable technique faced in engineering problems

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

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
240502

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

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

Unit-I

Basics of Python Tool, Introduction to Data Science, Various Fields of Data Science, Impact of Data Science, Data Analytics Life Cycle, Data Science Toolkit, Version Controlling.

Unit-II

Understanding data, Types of data: Numeric, Categorical, Graphical, High Dimensional Data, Classification of Digital Data: Structured, Semi-Structured and Unstructured, Source of Data: Time Series, Transactional Data, Biological Data, Special Data, Social Network Data, Data Evolution.

Unit-III

Data Acquisition and Data wrangling: Accessing Database, CSV and JSON Data, Data Cleaning and Transformation using Pandas and Sklearn, Data Visualization, Missing Value Analysis, Correction Matrix, Outlier Detection Analysis, Feature Engineering.

Unit -IV

Descriptive Statistics: Measures of Center and Spread, Estimation Distributions, Inferential Statistics: Sampling Distributions, Hypothesis Testing. Probability Theory, Conditional Probability, Maximizing and Minimizing Algebraic Equations, Matrix Manipulation and Multiplication.

Unit -V

Supervised Learning: Regression, classification, decision trees, random forest, Unsupervised Learning: PCA, Clustering. Application of Data Science, Use Case:

Consumer Product usage Analysis, Search Engines, Targeting Recommendation, Gaming etc.

RECOMMENDED BOOKS

- Introduction to linear algebra - by gilbert strang
- Applied statistics and probability for engineers – by douglas montgomery
- Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing, and Presenting Data – EMC Education
- Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython – Wes McKinney.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define the fundamentals of data science and its importance.

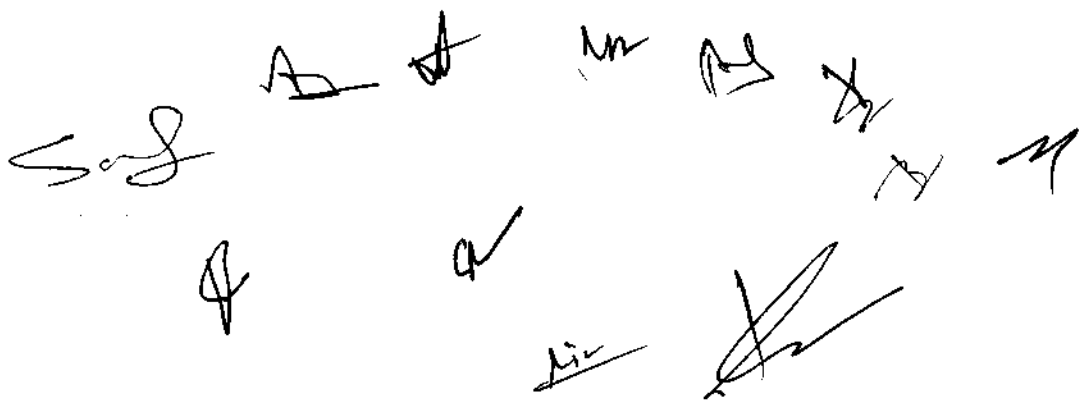
CO2. contrast the basics of python and libraries related to data science

CO3. classify different types of data analytics

CO4. organize the data collected from various sources

CO5. analyze pre-processing and data reduction strategies.

CO6. create the graphical representation of the data through visualization tool on various applications.



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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
240503

L	T	P	Total Credits
2	1	2	4

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 of Automata Theory: 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. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

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.

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.

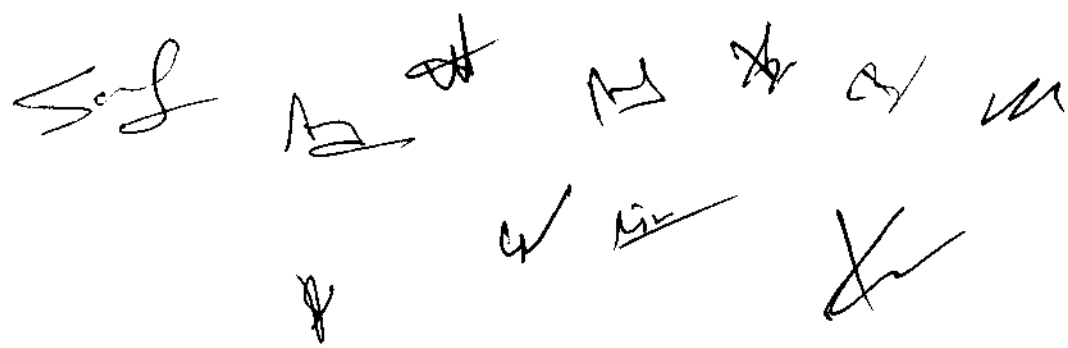
CO2. relate practical problems to languages, automata, computability and complexity.

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

CO4. analyze 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 INFORMATION TECHNOLOGY

ROBOTICS SYSTEM AND CONTROL

240504

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To learn the fundamentals of Robotics.
- To lean fundamentals of robot kinematics.
- To understand Trajectory planning tool and Interface.
- To working Sensor and Actuators in robot.
- To know about Robotics vision and application.

Unit-I

Introduction to Robotics, History of Robotics, Definition, Characteristics, Architecture of Robotic System, Classification of Robots and Robotic Systems, Advantages and Disadvantages of Robots, Application, Robot Components and Functions, Laws of Robotic, Robot Degrees of Freedom, Robot Joints and Co-Ordinate Systems, Sequence of Robotics Action.

Unit-II

Kinematics of Robot, Robots as Mechanisms Open and Closed Kinematic Mechanisms, Matrix Representation and Transformation, Robot Dynamics, Forward and Inverse Kinematics, Forward and Inverse Kinematics Equations, Direct Vs. Inverse Kinematic Task.

Unit-III

Basics of Trajectory Planning, Joint-Space Trajectory Planning, Cartesian-Space Trajectories, Continuous Trajectory Recording, Robot End Effectors, Types of End Effectors, Types of Grippers, Tools and Interface.

Unit-IV

Sensor and Actuators in Robot, Sensors, Type of Sensors, Characteristics of Sensors, Touch, Force/Moment and Tactile Sensors, Actuators, Type of Actuators, Hydraulic, Magnetostrictive Actuators, Pneumatic Devices, Characteristics and Comparison of Actuating Systems, Drive and Control Scheme, Electric Motors, Electro-Active Polymer Actuators.

Unit-V

Robot Vision, Robot Motion Planning, Gross and Fine Motion, Planning Approach, Intelligent Robot, Biped Walking, Robot Workspace, Internet of Robotic Things and Component of Iort, Algorithm for Intelligent System.

RECOMMENDED BOOKS

- Saeed B. Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001.
- R. K. Mittal and I. J. Nagrath, Robotics and Control, TMH, 2003.
- Computer Vision: Algorithms and Applications, Richard Szeliski, Ed. Springer, 2010.
- Computational Intelligence, Davis Poole, Alan Mackwath, Randy Coehel, Oxford University Press1998.

COURSE OUTCOMES

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

CO1. illustrate different basic terms related to robotics and their functions

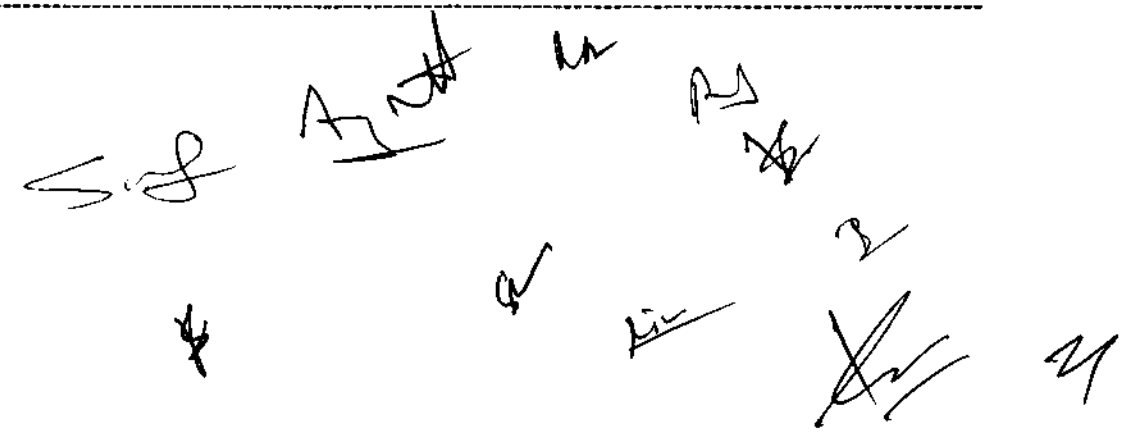
CO2. summarize fundamentals of robot kinematics and control system.

CO3. classify different kind of sensor and actuators used in robotics.

CO4. explain basics of Trajectory planning in robotics and its end effectors.

CO5. know about Robot vision, motion planning and robot application

CO6. describe concept of algorithm for intelligent system and internet of robotics things.



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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFT COMPUTING TECHNIQUES
240505

L	T	P	Total Credits
3	-	-	3

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction to Soft Computing: Soft Computing v/s Hard Computing, Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, Supervised Learning Networks: Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, Defuzzification: Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-III

Evolutionary Algorithm: Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-IV

Introduction to Nature-Inspired Optimization Algorithms: Particle Swarm Optimization (PSO) Algorithm, Differential Evolution (DE) Algorithm, Artificial Bee

Colony (ABC) Algorithm, Ant Colony Optimization (ACO) Algorithm, Cuckoo Search (CS), Firefly Algorithm (FA), Immune Algorithm (IA), Grey Wolf Optimization (GWO), Spider Monkey Optimization.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS). Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH.
- Evolutionary Optimization Algorithms, D. Simon (2013), Wiley.
- Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications, L. N. de Castro (2006), CRC Press.

COURSE OUTCOMES

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

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised learning.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - VII

Experiments List/Lab manuals of Laboratory Courses B. Tech V Semester (Batch Admitted in 2020-21) (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics) Under Flexible Curriculum

[ITEM IT-10]

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DEPARTMENT OF INFORMATION TECHNOLOGY

Experiments List/Lab manuals of Laboratory Courses B. Tech V Semester (Batch Admitted in 2020-21) (Information Technology) Under Flexible Curriculum

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
160512

LIST OF PROGRAMS

1. Write a python program to compute
    a. Central Tendency Measures: Mean, Median, Mode
    b. Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for data science such as Pandas and Matplotlib
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Write a Python program to implement Simple Linear Regression
6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
7. Implementation of Decision tree using sklearn and its parameter tuning
8. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
9. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets
10. Implementation of KNN using sklearn
11. Implementation of Logistic Regression using sklearn
12. Implementation of K-Means Clustering
13. Performance analysis of Classification Algorithms on a specific dataset.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
160513

LIST OF PROGRAMS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a program for accepting decimal number divisible by 5.
4. Design a Program for creating machine, which accepts 2 Mod 3.
5. Design a program for creating a machine, which accepts even of 1's and 0's.
6. Design a Program to find 2's complement of a given binary number.
7. Design a Program, which will increment the given binary number by 1.
8. Design a Program to convert NDFA to DFA.
9. Design a program to create PDA to accept a^nb^n where n>0.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a program to create PDA to accept WCWR where w is any string, WR is reverse of that string, and C is a Special symbol.
12. Design a Turing machine that accepts the following language an b^nc^n where n>0.

COURSE OUTCOMES

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

CO1. judge various computational models.

CO2. construct abstract models of computing.

CO3. justify the power of abstract models in computing to recognize the languages.

CO4. demonstrate analytical thinking and intuition for problem solving in the related areas.

CO5. discuss the limitations of computation in problem solving.

CO6. follow set of rules for syntax verification.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACEING
160514

LIST OF EXPERIMENTS

1. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
3. Write an assembly language program to move data block starting at location 'X' to location 'Y' with overlap using 8085/8086 instruction set.
4. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
5. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
6. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
9. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
11. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.
12. Write an ALP program to generate a Fibonacci series using 8085/8086 instruction set.
13. Write an ALP to find the factorial of a given number using recursive procedure using 8085/8086 instruction set.
14. Write an ALP to separate odd and even numbers using 8085/8086 instruction set.
15. Write an ALP to separate positive and negative numbers using 8085/8086 instruction set.
16. Write an ALP to transfer of a string in forward direction using 8086 instruction set.

COURSE OUTCOMES

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

CO1. differentiate the various types of instructions and addressing modes.
CO2. identify the Hex code/ Machine code of instructions in assembly language.
CO3. perform interfacing of various peripheral devices and memory with microprocessor.
CO4. demonstrate the arithmetic & Logical operation using instruction set of 8086 /8051 microprocessor.
CO5. use of 8086/8051 for interfacing with I/O devices.
CO6. build the assembly language programs in 8086/8051 to solve real world problems.

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Experiments List/Lab manuals of Laboratory Courses B. Tech V Semester (Batch Admitted in 2020-21) (Internet of Things (IoT)) Under Flexible Curriculum

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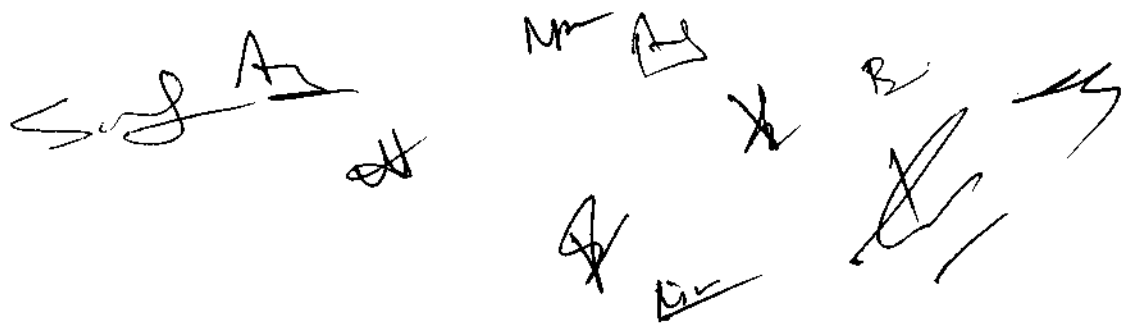
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCES IN IOT
230503

LIST OF PROGRAMS

1. Write a python program to compute
    a. Central Tendency Measures: Mean, Median, Mode
    b. Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for data science such as Pandas and Matplotlib
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Write a Python program to implement Simple Linear Regression
6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
7. Implementation of Decision tree using sklearn and its parameter tuning
8. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
9. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets
10. Implementation of KNN using sklearn
11. Implementation of Logistic Regression using sklearn
12. Implementation of K-Means Clustering
13. Performance analysis of Classification Algorithms on a specific dataset.



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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
230503

LIST OF PROGRAMS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a program for accepting decimal number divisible by 5.
4. Design a Program for creating machine, which accepts 2 Mod 3.
5. Design a program for creating a machine, which accepts even of 1's and 0's.
6. Design a Program to find 2's complement of a given binary number.
7. Design a Program, which will increment the given binary number by 1.
8. Design a Program to convert NDFA to DFA.
9. Design a program to create PDA to accept $a^n b^n$ where n>0.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a program to create PDA to accept WCWR where w is any string, WR is reverse of that string, and C is a Special symbol.
12. Design a Turing machine that accepts the following language an $b^n c^n$ where n>0.

COURSE OUTCOMES

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

CO1. judge various computational models.

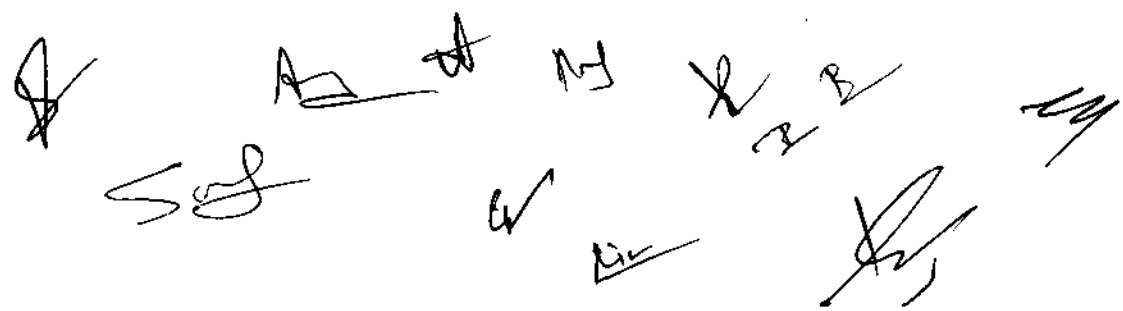
CO2. construct abstract models of computing.

CO3. justify the power of abstract models in computing to recognize the languages.

CO4. demonstrate analytical thinking and intuition for problem solving in the related areas.

CO5. discuss the limitations of computation in problem solving.

CO6. follow set of rules for syntax verification.



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DEPARTMENT OF INFORMATION TECHNOLOGY

EMBEDDED SYSTEMS & IOT
230504

LIST OF PROGRAMS

1. Introduction to ARM/ RaspberryPi Boards (Installation and Setup)
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and print the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect objects using IR Obstacle Sensor.
8. Write a program to detect the presence of Gas using a GAS Sensor.
9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
11. Write a program to detect motion using Motion Sensor (PIR sensor).
12. Write a Program to detect presence of smoke using Smoke Sensor.
13. Write a program to interface a range sensor with an arduino board and understand the principle behind an ultrasonic range sensor.
14. Write a program to interface DHT11 and Range sensor using a single board.
15. Write a program to show sensor data (DHT11, Time, Message, Countdown) on LCD Display.
16. Write a program to demonstrate MQTT- Publish/ Subscribe concept using IoT Device.
17. Write a program to demonstrate the concept of MQTT- Broker using IoT Device.
18. Write a program to send and receive messages to IoT Devices using MQTT.
19. Write a program to demonstrate different Iot Protocols STOMP, DDS, XMPP, SSE, LwM2M or Lightweight M2M, LPWAN, CoAP, Bluetooth and WiFi etc.

COURSE OUTCOMES

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

CO1. define the basic concept of Embedded System.

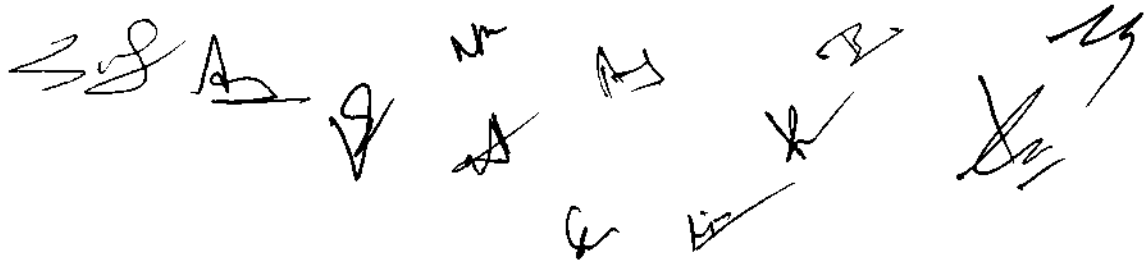
CO2. describe the basic principles of Arduino programming and IDE.

CO3. familiarize with different types of sensors and related systems.

CO4. design, implement, debug and test programs/ systems.

CO5. design and develop Smart systems applications.

CO6. interface different sensors to embedded boards like arduino.



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DEPARTMENT OF INFORMATION TECHNOLOGY

Experiments List/Lab manuals of Laboratory Courses B. Tech V Semester (Batches Admitted in 2020-21) (Artificial Intelligence and Robotics) Under Flexible Curriculum

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
240502

LIST OF PROGRAMS

1. Write a python program to compute
    a. Central Tendency Measures: Mean, Median, Mode
    b. Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for data science such as Pandas and Matplotlib
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
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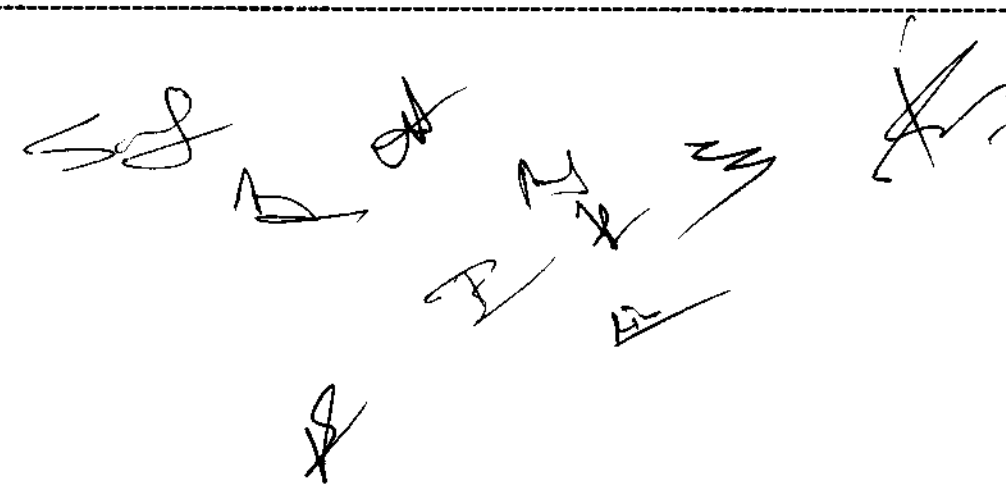

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
240503

LIST OF PROGRAMS

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COURSE OUTCOMES

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CO2. construct abstract models of computing.

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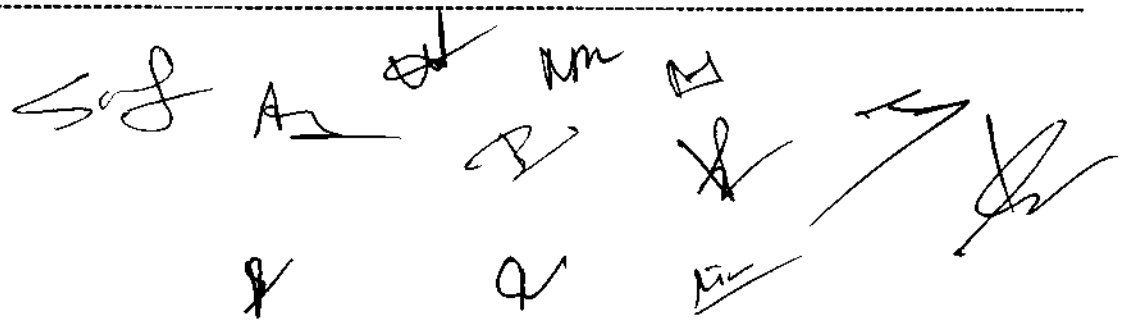

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DEPARTMENT OF INFORMATION TECHNOLOGY

ROBOTICS SYSTEM AND CONTROL
240504

LIST OF PROGRAMS

1. Programming a simple Robot on Wheels.
2. Experiments based on Humanoid Robot.
3. Programming a Walking Robot.
4. Line Detection/followers robot.
5. Path detection robot.
6. Obstacle detection and avoidance Robotic vehicle using ultrasonic sensor.
7. Path follower robot.
8. Human following robot using Arduino/Jetson Nano/Raspberry-pi.
9. Depth sensing /Edge detection robot using Jetson.

COURSE OUTCOMES

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

CO1. apply programming concept to implement robotics tasks.

CO2. understand different hardware component related to robot.

CO3. learn about working of humanoid, Wheels Robots.

CO4. implement obstacle detection and avoidance problems.

CO5. know about working of Arduino/ Raspberry-pi.

CO6. implement robotics tasks using Jetson Nano.

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ANNEXURE - VIII

List of Skill Based Mini Project of Laboratory Courses B. Tech V Semester (Batch Admitted in 2020-21) (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics) Under Flexible Curriculum

[ITEM IT-11]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

List of Skill Based Mini Project of Laboratory Courses B. Tech V Semester (Batches Admitted in 2020-21) (Information Technology) Under Flexible Curriculum

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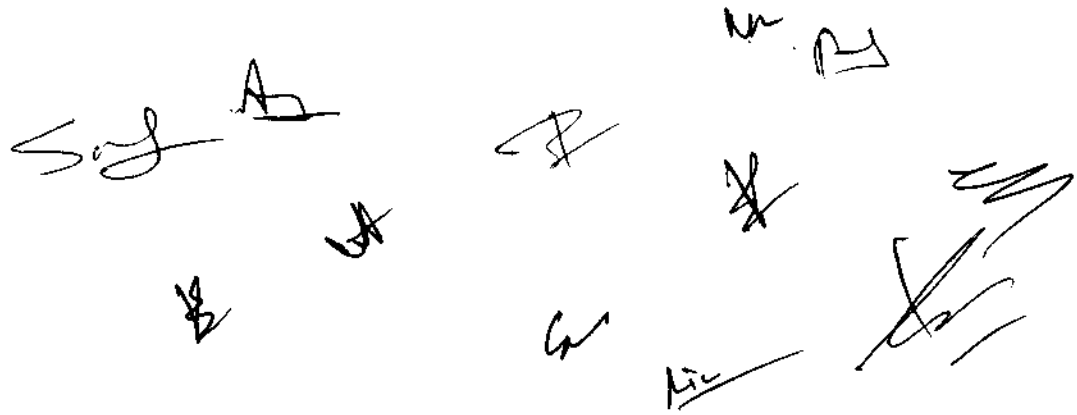
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
160512

LIST OF SKILL BASED MINI PROJECT

1. Movie Recommendation System- A recommendation system sends out suggestions to users through a filtering process based on other users' preferences and browsing history. If A and B like Home Alone and B likes Avengers, it can be suggested to A. Dataset: MovieLens dataset.
2. Customer Segmentation- Identify segments of customers to target the potential user base using clustering (i.e. K-means clustering). Divide customers into groups according to common characteristics like gender, age, interests and spending habits. Dataset: Mall_Customers dataset.
3. Fake News Detection- Fake news is sometimes transmitted through the internet by some unauthorised sources, which creates issues for the targeted person and it makes them panic and leads to even violence. Dataset: fake-news kaggle.
4. Cab Pickups Analysis- cab pickup and distribution, time, days when pickup happens regularly, Dataset: Uber-Pickups dataset.
5. Price Recommendation for Online Sellers.



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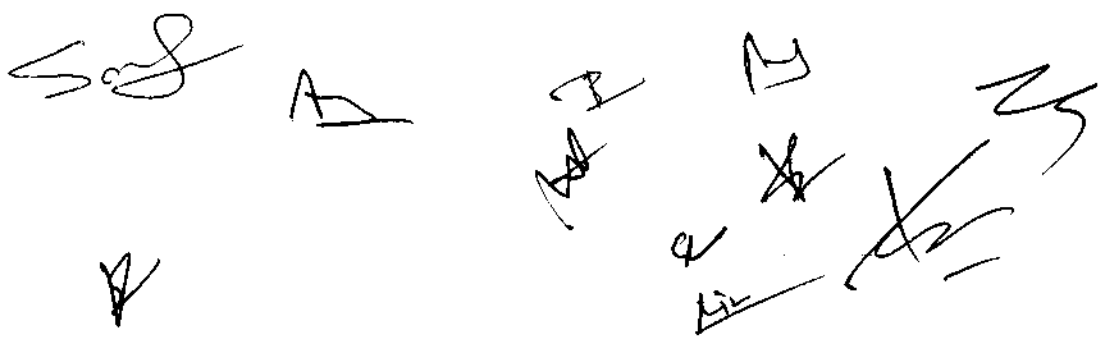
DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
160513

LIST OF SKILL BASED MINI PROJECT

1. Construct a machine to recognize identifier.
2. Construct a machine to recognize signed or unsigned decimal number.
3. Construct a machine to recognize string, which ends with Gwalior or Bhopal.
4. Design a machine which accept at least single a followed by at least single b followed by at least single c.
5. Design a machine that will read sequence made up of letter A,E,I,O,U and will give as output the same sequences except that in case where an I directly follows an E, it will be changed to u.
6. Design a machine for binary input sequence such that if it has substring 101 the machine outputs A if input has substring 110 it outputs B otherwise it Output C.
7. Design a machine which accepts the string consist of a & b in which number of a's are more than number of b's.
8. Design a machine which accepts the string consist of a & b in which number of a's are less than number of b's.
9. Construct a machine for checking the palindrome of the string of even length.
10. Construct a machine for concatenation of the two strings of urinary number.



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DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSOR & INTERFACEING
160514

LIST OF SKILL BASED MINI PROJECT

1. Traffic light controller using 8085/8086 microprocessor.
2. Night light saver using 8085/8086 microprocessor.
3. Interfacing 8085 with Stepper Motor controller.
4. Interfacing 8085 with DC motor controller.
5. Interfacing 8085 with keypad.
6. Interfacing 8085 with LED's.
7. Interfacing 8085 with switches.
8. Interfacing 8085 with ADC.
9. Interfacing 8085/8086 with 8255 PPI.
10. Interfacing 8085/8086 with 8251.

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DEPARTMENT OF INFORMATION TECHNOLOGY

List of Skill Based Mini Project of Laboratory Courses B. Tech V Semester (Batches Admitted in 2020-21) (Internet of Things (IoT)) Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE IN IoT
230502

LIST OF SKILL BASED MINI PROJECT

1. Movie Recommendation System- A recommendation system sends out suggestions to users through a filtering process based on other users' preferences and browsing history. If A and B like Home Alone and B likes Avengers, it can be suggested to A. Dataset: MovieLens dataset.
2. Customer Segmentation- Identify segments of customers to target the potential user base using clustering (i.e. K-means clustering). Divide customers into groups according to common characteristics like gender, age, interests and spending habits. Dataset: Mall_Customers dataset.
3. Fake News Detection- Fake news is sometimes transmitted through the internet by some unauthorised sources, which creates issues for the targeted person and it makes them panic and leads to even violence. Dataset: fake-news kaggle.
4. Cab Pickups Analysis- cab pickup and distribution, time, days when pickup happens regularly, Dataset: Uber-Pickups dataset.
5. Price Recommendation for Online Sellers.

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
230503

LIST OF SKILL BASED MINI PROJECT

1. Construct a machine to recognize identifier.
2. Construct a machine to recognize signed or unsigned decimal number.
3. Construct a machine to recognize string, which ends with Gwalior or Bhopal.
4. Design a machine which accept at least single a followed by at least single b followed by at least single c.
5. Design a machine that will read sequence made up of letter A,E,I,O,U and will give as output the same sequences except that in case where an I directly follows an E, it will be changed to u.
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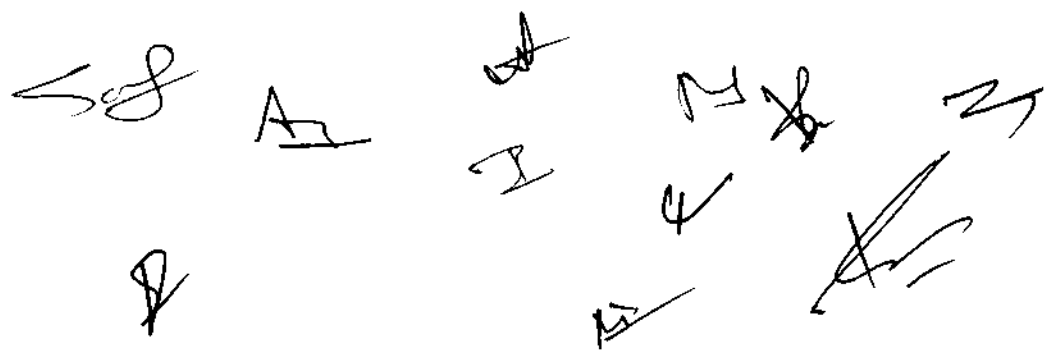

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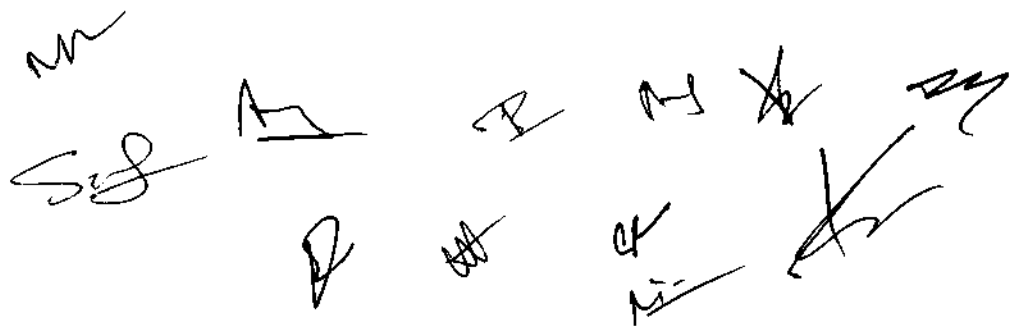
DEPARTMENT OF INFORMATION TECHNOLOGY

EMBEDDED SYSTEMS & IOT
230504

LIST OF SKILL BASED MINI PROJECT

1. Design intelligent home locking system using a stepper motor (working as a lock) and nodeMCU (as a wireless transmitter and receiver) interfaced to ARM/ RaspberryPi.
2. Design Intelligent water level management system using through depth sensor the ARM/ RaspberryPi alerts the user through call by using GSM module, (NodeMCU). The proposed system evacuates the water to a storage tank through a submersible water pump.
3. Design and development of a RFID based Room Automation using microcontroller. RFID system uses Radiofrequency electromagnetic fields to transfer data from a RFID tag to identify and track the object. This system will apply Radio Frequency technology, which consists of RFID Tags, RF Readers with antennas, Arduino, transmitter- receiver, and added networking properties to identify and track objects.
4. Design and development of an IoT-based smart home automation system using a microcontroller-based RaspberryPi board and mobile-based Short Message Service (SMS) application working functionality with Wi-Fi connectivity to establish communication between the ARM/ RaspberryPi module and automated home appliances.
5. Design and development Intelligent Automatic Irrigation System using an RaspberryPi, servo motor to control and sense the thing in the projects such as sense or measure the moisture in the soil we are using soil moisture sensor. The RaspberryPi sends the signals to the relay module and the water pump is turned on for some time and can change the time by modifying the code.
6. Design and Development of Motion Detection system using Raspberry-pi / Arduino UNO, Motion Sensor.
7. Design and Development of Air Quality Monitoring System, which will provide real-time data related to the current air quality in the room through the use of sensors and microcontrollers, data will be sent to computer using MQTT protocol. Demonstrate dust density of the room in real-time on GUI.



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DEPARTMENT OF INFORMATION TECHNOLOGY

List of Skill Based Mini Project of Laboratory Courses B. Tech V Semester (Batches Admitted in 2020-21) (Artificial Intelligence and Robotics) Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA SCIENCE USING PYTHON
240502

LIST OF SKILL BASED MINI PROJECT

1. Movie Recommendation System- A recommendation system sends out suggestions to users through a filtering process based on other users' preferences and browsing history. If A and B like Home Alone and B likes Avengers, it can be suggested to A. Dataset: MovieLens dataset.
2. Customer Segmentation- Identify segments of customers to target the potential user base using clustering (i.e. K-means clustering). Divide customers into groups according to common characteristics like gender, age, interests and spending habits. Dataset: Mall_Customers dataset.
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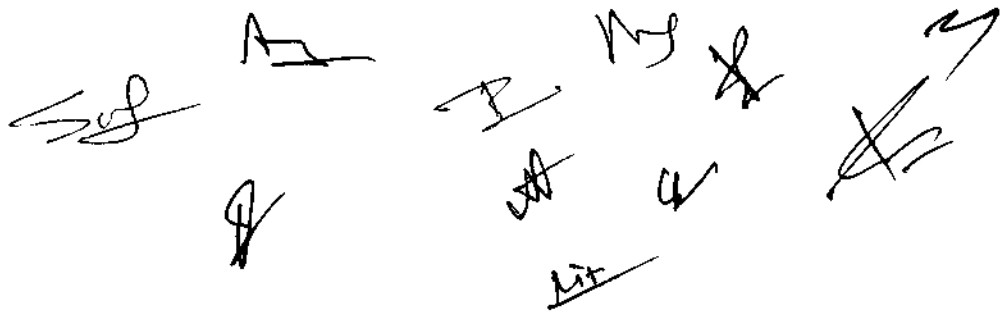

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEORY OF COMPUTATION
240503

LIST OF SKILL BASED MINI PROJECT

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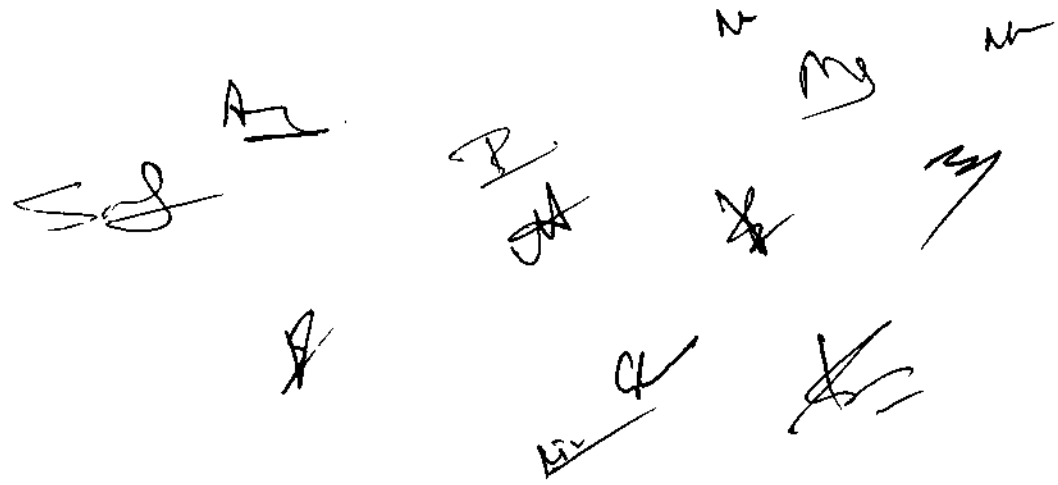

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DEPARTMENT OF INFORMATION TECHNOLOGY

ROBOTICS SYSTEM AND CONTROL
240504

LIST OF SKILL BASED MINI PROJECT

1. Implement a project of Fast line follower robot (PID algorithm)
2. Implement a project of Smart robot for face detection/Recognition
3. Implement a project of Remote Controlled robot
4. Implement a project of Arduino based Smartphone control robot car
5. Implement a project of Color sensing Robot
6. Implement a project of Greeting Robot
7. Implement a project of Maze solving Robot
8. Implement a project of Voice controlled Robot

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - IX

Scheme & Syllabi
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning)
Under Flexible Curriculum

[ITEM IT -13]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Artificial Intelligence and Data Science)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester *(Artificial Intelligence (AI) and Data Science)*

(for batches admitted in academic session 2021-22 onwards)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: Proficiency in subject /course	Theory Slot: Continuous Evaluation: Mid Sem. Exam.	Theory Slot: Continuous Evaluation: Quiz/Assignment	Theory 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 (Offline Online)	Mode of Exam.
1.	270101	DC	Introduction to Artificial Intelligence & Data Science	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3:1)	MCQ
2.	270102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended	
4.	250100	BSC	Linear Algebra	50	10	20	20				100						
5.	100015	HSMC	Energy Environment Ecology & Society	50	10	20	20				100						
Total				250	50	100	100	120	40	40	700	14	03	04	19		

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.

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

Mode of Teaching: Theory: Offline	Theory: Online	Theory: Blended: Offline	Theory: Blended: Online	Lab: Offline	Mode of Examination: Theory: PP	Theory: A+O	Theory: MCQ	Lab: SO	Credits
04	03	07	03	02	04	03	10	02	19
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.63%	10.53%	Credits

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

Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester *(Artificial Intelligence (AI) and Data Science)*

(for batch admitted in academic session 2021-22 onwards)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	[$]Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	270201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2:1)	PP
2.	250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Online	PP
3.	270202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2:1)	PP
4.	270203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2:1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2:1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				**250**	**50**	**100**	**100**	**180**	**60**	**60**	**800**	**14**	**02**	**06**	**19**		

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.

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

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
04	-	08	04	03	13	03	-	03	19
21.05%	-	42.11%	21.05%	15.79%	68.42%	15.79%	-	15.79%	Credits %

ACADEMICS
MITS
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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester *(Artificial Intelligence (AI) and Data Science)*

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam	Proficiency in subject course	Mid Sem. Exam	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	270301	BSC	Discrete Structure	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	270302	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	270303	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	270304	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	270305	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
6.	270306	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO
7.	270307	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	GLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	0	Interactive	SO
9.	270308	DLC	Summer Internship Project–I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	10	6	14	-	-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLP/ NEC	
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
04	-	08	04	06	01	15	-	-	07	01	23
17.39%	-	34.78%	17.39%	26.09%	04.35%	65.22%	-	-	30.43%	4.35%	Credits %

DEAN (ACADEMICS)
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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Artificial Intelligence and Machine Learning)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (*B. Tech in Artificial Intelligence and Machine Learning*)

(for batches admitted in academic session 2021-22 onwards)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot: End Term Evaluation: End Sem. Exam	Theory Slot: End Term Evaluation: Proficiency in subject /course	Theory Slot: Continuous Evaluation: Mid Sem. Exam.	Theory Slot: Continuous Evaluation: Quiz/ Assignment	Theory 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 (Offline/ Online)	Mode of Exam.
1.	280101	DC	Introduction to Artificial Intelligence & Machine Learning	50	10	20	20	-	-	-	100	3	-	-	3	[illegible]	[illegible]
2.	280102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	MCQ
3.	135022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	MCQ
4.	100004	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	[illegible]	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
			Total	250	50	100	100	120	40	40	700	14	3	4	19		

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.

Course subject = includes the weightage towards ability/skill/ competency/knowledge level/expertise attained etc. in that particular course/subject

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

Mode of Learning: Theory: Offline	Theory: Online	Theory: Blended: Offline	Theory: Blended: Online	Lab: Offline	Lab: Online	Mode of Examination: Theory: PP	Theory: A+O	Theory: MCQ	Lab: SO	Total Credits
04	03	03	03	02	04	03	10	02	19	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

DEAN (ACADEMICS)
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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester *(Artificial Intelligence (AI) and Data Science)*

(for batch admitted in academic session 2021-22 onwards)

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				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	*Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	220201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
2.	250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
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6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
		Total		250	50	100	100	180	60	60	800	14	02	06	19		

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

Mode of Teaching					Mode of Examination			Total Credits
Offline	Online	Blended	Lab		PP	AO	MCQ	
								19

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester *(Artificial Intelligence (AI) and Machine Learning)*

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam	[$]Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	280301	BSC	Discrete Structure	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	280302	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (Off)	PP
3.	280303	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended (Off)	PP
4.	280304	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	2	1	-	3	Blended (Off)	PP
5.	280305	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (Off)	PP
6.	280306	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO
7.	280307	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	[redacted]	[redacted]	[redacted]												Interactive	
9.	280308	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	10	6	14		-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

[$] 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

Mode of Teaching						Mode of Examination					Total Credits
Theory				Lab	NEC	Theory			Lab	SIP/ SLP/ NEC	
Offline	Online	Blended (Off)	Blended (On)	Offline	Interaction	PP	A+O	MCQ	SO	SO	
04	-	04	04	06	01	15	-	-	07	01	23
17.39%	-	17.39%	17.39%	26.09%	04.35%	65.22%	-	-	30.43%	4.35%	Credits %

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DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
(along with the Course Outcomes)
of
B. Tech. III Semester
(Artificial Intelligence and Data Science/ Artificial Intelligence and Machine Learning)
(Batch Admitted in 2021-22)
Under Flexible Curriculum

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DEPARTMENT OF INFORMATION TECHNOLOGY

DISCRETE STRUCTURES
270301/280301

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

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Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional 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-III

Introduction and Basic Terminology of Graphs, Planner Graphs, 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-IV

Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations With Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

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Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring, Integral Domain and Field.

RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science. Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition).2006. McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics. 2008. Tata McGraw-Hill.
- T. Koshy: Discrete mathematics with applications.2003. Academic Press.
- J. Hein: Discrete structures, logic and computability.2009. Jones & Bartlett Publishers.

COURSE OUTCOMES

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

CO1. explain the basic concept of set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure.

CO2. illustrate the knowledge of course content and distinguish between them in terms of their applications.

CO3. identify the concepts of graph and tree for solving problems in the computer science.

CO4. apply the concepts of studied topics with suitable technique faced in engineering problems

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

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
270302/280302

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and Additional Real World Problems on Divide and Conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix Chain Multiplication

Unit-V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate a familiarity with major algorithms and data structures.

CO2. idenify important algorithmic design paradigms and methods of analysis.

CO3. analyze the performance of algorithms.

CO4. compare various algorithm design techniques.

CO5. select the design technique to solve any real world problem.

CO6. design efficient algorithm using various design techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEM
270303/280303

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

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

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

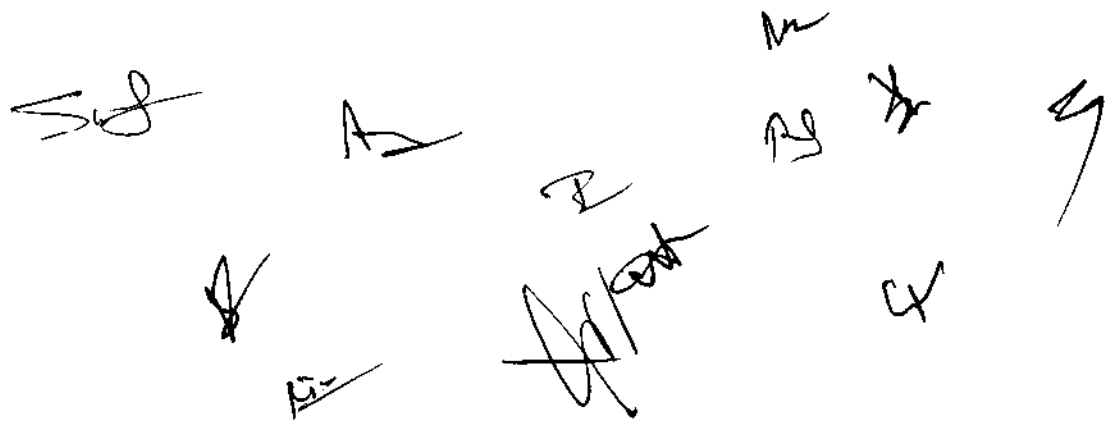
RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. define the basic concept of operating systems.
CO2. explain the working procedure of the operating system.
CO3. analyze the various operating system problems and issues.
CO4. determine the solutions for various operating system problems and issues.
CO5. evaluate the performance of various scheduling and allocation techniques.
CO6. elaborate the working of various scheduling and allocation techniques.



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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS AND PROTOCOLS
270304/280304

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

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

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

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- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication. Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features-Numbering System, Flow Control, Error Control. Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control-Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer-Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer-Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.
- TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
- Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
- TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

COURSE OUTCOMES

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

CO1. explain the fundamental concepts of computer network.

CO2. illustrate the basic taxonomy & terminologies of computer network protocols.

CO3. develop a concept for understanding advance computer network.

CO4. build the skill of IP addressing and routing mechanism.

CO5. predict the performance of computer network in congestion and internet.

CO6. construct the network environment for implementation of computer networking concept.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
270305/280305

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL), Triggers.

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate the concepts of different types of database system.

CO2. apply relational algebra concepts to design database system.

CO3. make use of queries to design and access database system.

CO4. analyze the evaluation of transaction processing and concurrency control.

CO5. determine the normal form of the relation.

CO6. design a ER diagram/database system for a real world application.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
270306/280306

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, Scipy; Test Case: Panda, Matplotlib.

RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568.

COURSE OUTCOMES

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

CO1. define basics syntax and features of python programming language

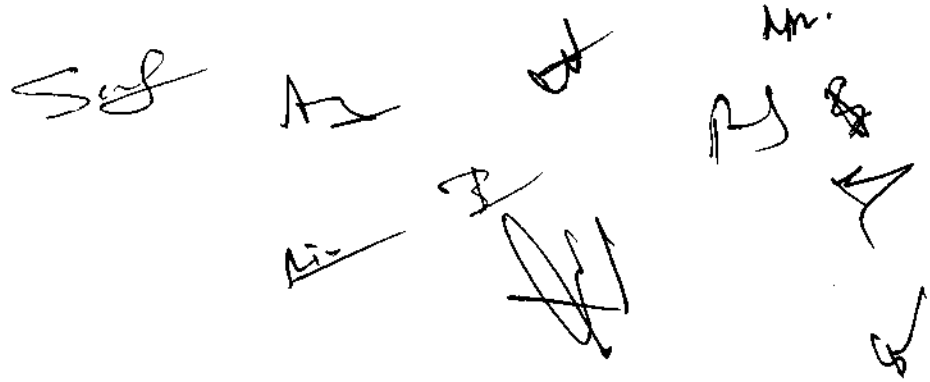
CO2. solve computational problem using python language.

CO3. take part in online coding platforms.

CO4. inspect the python program for errors.

CO5. design a program using the features of object oriented concept.

CO6. construct the python code for real world problem using the libraries.



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - X

List of Experiments and Skill Based Mini Project for Laboratory Courses B.Tech III Semester (Batches admitted in 2021-22) (Artificial Intelligence and Data Science/ Artificial Intelligence and Machine Learning) Under Flexible Curriculum

[ITEM IT -14]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
270302/280302

LIST OF PROGRAMS

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

COURSE OUTCOMES

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

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

CO2. demonstrate basic algorithms and different problem solving strategies.

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

CO4. analyze running times of algorithms using asymptotic analysis.

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

CO6. design and implement optimization algorithms in specific applications.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
270302/280302

LIST OF SKILL BASED MINI PROJECT

1. Implement tree traversal techniques like pre-order, post-order and in-order.
2. Implementation of divide and conquer based merge sort algorithm, quick sort algorithm.
3. Implementation of divide and conquer based matrix multiplication algorithm.
4. Implement the greedy approach for single source shortest path.
5. Design a program for finding minimum cost tree for traversing all nodes of a graph.
6. Implement the Knapsack problem and 0/1 Knapsack problem.
7. Implement the travelling salesman problem using dynamic programming.
8. Implement matrix chain multiplication using dynamic programming.
9. Design a program for 4 and 8 queen problem.
10. Implement a program for polynomial reduction.
11. Implement a phone directory application using doubly-linked lists.
12. Implement the movement of knight in chess game.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
270305/280305

LIST OF PROGRAMS

While creating tables, databases the name should have a prefix of your roll number.

Ex. If your roll number is 55 then every table name must start with 55 TABLE_NAME. 1. Write program name 2. Write description of command used for executing the query. 3. Write commands in bold letters. 4. Take the screenshot of the output.

1. Implementation of DDL commands of SQL with suitable examples.
   a. Create table
   b. Alter table
   c. Drop Table
2. Implementation of DML commands of SQL with examples.
   a. Insert
   b. Update
   c. Delete
3. Implementation of different type of function with suitable example
   a. Number function
   b. Aggregate function
   c. Character function
   d. Conversion function
   e. Data function
4. Implementation of different type of operators in SQL.
   a. Arithmetic operators
   b. Logical operators
   c. Set operator
   f. Comparison Operator
   g. Special operator
5. Implementation of type of joins.
   a. Inner Join
   b. Outer Join
   c. Natural Join etc.
6. Study and implementation of
   a. Group by & having clause
   b. order By clause
   c. Indexing
7. Study of Implementation of
   a. Sub queries
   b. Views
8. Study & implementation of different type of constraints.
9. Study & implementation of database backup & recovery command.
10. Study & implementation of Rollback, commit, savepoint.

11. Creating Database /Table Space
    a. Managing Users: Create User, Delete User
    b. Managing roles: Grant, Revoke.

COURSE OUTCOMES

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

CO1. construct database schema for a given problem domain.

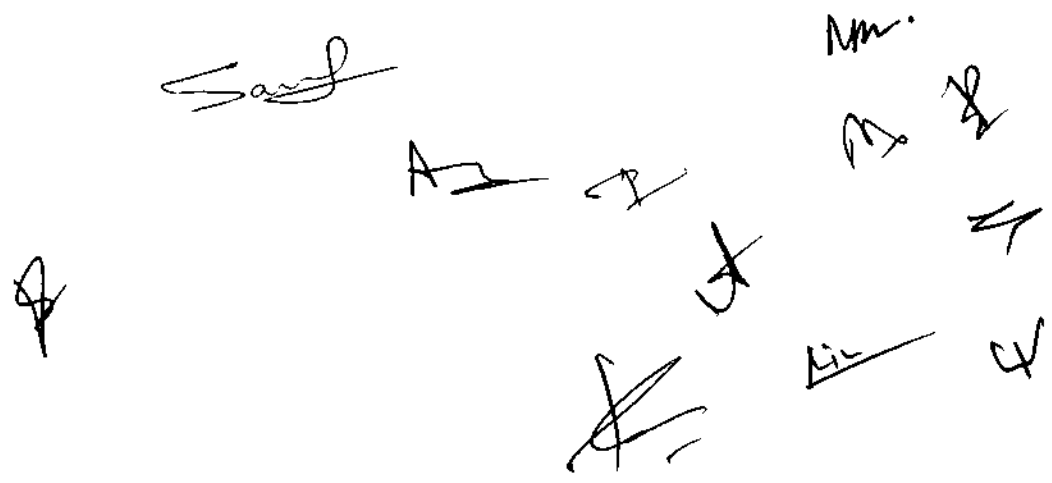
CO2. apply integrity constraints on a database schema using a state-of-the-art RDBMS.

CO3. apply SQL queries using DDL and DML to design and access database systems.

CO4. make use of operators and functions used in query.

CO5. distinguish Tables and Views for database systems.

CO6. develop a small project for a real world scenario.



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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
270305/280305
LIST OF SKILL BASED MINI PROJECT

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Design ER-Diagram, Create Schema and insert at least 5 records for each table. Add appropriate database constraints

Mini Skill Project 1

Consider the following schema for a Library Database:
BOOK (Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS (Book_id, Author_Name)
PUBLISHER (Name, Address, Phone)
BOOK_COPIES (Book_id, Programme_id, No-of_Copies)
BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Skill Project 2

Consider the following schema for Order Database:
SALESMAN (Salesman_id, Name, City, Commission)
CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)
ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)
Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Mini Skill Project 3

Consider the schema for Movie Database:
ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)

Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

Mini Skill Project 4

Consider the schema for College Database:
STUDENT (USN, SName, Address, Phone, Gender)
SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
COURSE (Subcode, Title, Sem, Credits)
IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA< 12 then CAT = 'Weak'
Give these details only for 8th semester A, B, and C section students.

Mini Skill Project 5

Consider the schema for Company Database:
EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo,DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

Write SQL queries to

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Mini Skill Project 6

A university registrar's office maintains data about the following entities:
(a)courses, including number, title, credits, syllabus, and prerequisites;
(b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
(c) students, including student-id, name, and program; and
(d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.
Construct an E-R diagram forthe registrar's office. Document all assumptions that you make about the mapping constraints.

Mini Skill Project 7

Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

Mini Skill Project 8

Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

Mini Skill Project 9

Design an E-R diagram for keeping track of the exploits of your favourite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

Mini Skill Project 10

Consider a database used to record the marks that students get in different exams of different course offerings.
a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
b. Construct an alternative E-R diagram that uses only a binary relationship between students and course-offerings. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
270306/280306

LIST OF PROGRAMS

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find the factorial of a number using recursion.
8. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.
9. WAP to read content of a file and write into another file.
10. Write a python program to define a module and import a specific function in that module to another program.

COURSE OUTCOMES

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

CO1. write, test, and debug simple Python programs.

CO2. solve computational problem using python language.

CO3. familiar with basics syntax and features of python programming language.

CO4. use Python lists, tuples, dictionaries for representing compound data.

CO5. design a program utilizing the features of object oriented concept.

CO6. utilize some of the libraries available for solving problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
270306/280306

LIST OF SKILL BASED MINI PROJECT

1. Implement a calculator using Tkinter library.
2. Design and implementation of Animal Kingdom Classification.
3. Design and implementation of Currency Converter.
4. Design and implementation of Snake Game in Java.
5. Design and implementation of a real-time, User friendly Currency Converter.
6. Design and implementation of a File Manager which supports various types of files.
7. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
8. Design any game of your choice like tic-tac-toe etc.
9. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
10. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
11. Design a program for spam filtering.
12. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
13. Implement countdown clock and timer.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XI

Scheme & Syllabi
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics)
Under Flexible Curriculum

[ITEM IT -15]

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DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Information Technology)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (Information Technology)

For batch admitted in academic session 2021 – 22

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam	*Proficiency in subject course	Mid Sem. Exam	Quiz. Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	160112	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
2.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
3.	100020	ESC	Basic Civil Engineering & Mechanics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	MCQ
5.	100015	HSMC	Energy, Environment Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
6.	160111	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
Total				250	50	100	100	180	60	60	800	11	04	08	19	-	-

Induction program of first three weeks (MC's Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

*** 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 OB: Open Book PP: Pen Paper SO: Submission - Oral

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
00	03	08	04	04	03	03	09	04	19
-	15.79%	42.11%	21.05%	21.05%	15.79%	15.79%	47.37%	21.05%	4 credits

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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester (Information Technology)

For batch admitted in academic session 2021 – 22

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted: Theory Slot – End Term Evaluation: End Sem. Exam.	Theory Slot – End Term Evaluation: *Proficiency in subject course	Theory Slot – Continuous Evaluation: Mid Sem Exam	Theory Slot – Continuous Evaluation: Quiz/ Assignment	Practical Slot: End Sem. Exam.	Practical Slot – Continuous Evaluation: Lab work & Sessional	Practical Slot – Continuous Evaluation: Skill Based Mini Project	Total Marks	Contact Hours per Week: L	T	P	Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
1.	100011	BSC	Engineering Mathematics – I	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	160211	DC	Data Structures	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	160212	DC	Object Oriented Programming & Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
4.	160213	DC	Digital Electronics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
			Total	250	50	100	100	180	60	60	800	13	03	06	[illegible]	-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

* 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 OB: Open Book PP: Pen Paper SO: Submission – Oral

Mode of Teaching: Theory: Offline	Theory: Online	Theory: Blended: Offline	Theory: Blended: Online	Lab: Offline
04	-	08	04	03
21.05%	-	42.11%	21.05%	15.79%

Mode of Examination: Theory: PP	Theory: A-O	Theory: MCQ	Lab: SO	
13	03	-	03	19
68.42%	15.79%	-	15.79%	[illegible]

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester (Information Technology)

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	100025	BSC	Engineering Mathematics-III	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP
2.	160311	DC	Computer System Organization	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2:1)	PP
3.	160312	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	PP
4.	160313	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	PP
5.	160314	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2:1)	PP
6.	160315	DLC	Java Programming Lab	-	-	-	-	60	20	20	100	-	1	2	2	Offline	SO
7.	160316	DLC	Self Learning/Presentation (SWAYAM NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	CLC	Audit Courses (Course on Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
9.	160317	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	10	06	14	[redacted]	-	-
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

$ 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

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
04	-	08	04	06	01	15	-	-	07	01	23
[redacted]					4.35%	65.21%	-	-	30.43%	4.35%	Credits %

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DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Internet of Things (IoT))
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

I Semester

For batch admitted in academic session 2021 – 22

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam	Quiz Assignment		Lab work & Sessional	Skill Based Mini Project*							
1.	230101	DC	Introduction to Internet of Things (IoT)	50	10	20	20	-			100	4	-	-	4	Blended (3:1)	MCQ
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	18	03	04			

Induction program of first three weeks: Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, [illegible] Visit/Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

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

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

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	Practical
		Offline	Online						
04	03	07	03	02	04	03	10	02	02
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.64%	10.53%	10.53%

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Internet of Things (IoT)

II Semester

For batch admitted in academic session 2021 –22

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline Online)	Mode of Exam
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem Exam.	Quiz Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20			-	100	2	1	-	3	Blended (2/1)	PP
2.	230302	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-		-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
Total				250	50	100	100	240	80	80	900	14	01	08	23		

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration; Evaluation in III Semester.

$ **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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
-	-	10	05	04	12	03	-	04	
-	-	52.63%	26.32%	21.05%	63.16%	15.79%	-	21.05%	

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Department of Information Technology

Scheme of Evaluation

B. Tech. Internet of Things (IoT)

III Semester

(for batch admitted in academic session 2021-22)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	Proficiency in subject /course	Mid Sem. Exam	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
2.	230301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	230302	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	230303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	230304	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
6.	230305	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	230306	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO
8.	200XXX	GLC	[illegible] (Informal Learning)	[illegible]				60			60					[illegible]	[illegible]
9.	230307	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	11	5	14		[illegible]	[illegible]
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	[illegible]	[illegible]

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

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
84	-	88	84	86	01	16	-	-	06	01	23
					4.35%	69.56%	-	-	26.09%	4.35%	Credits %

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DEPARTMENT OF INFORMATION TECHNOLOGY

Scheme
of
B. Tech III Semester
(Batch Admitted in 2021-22)
(Artificial Intelligence and Robotics)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

I Semester

For batch admitted in academic session 2021 – 22

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	[$] Proficiency in subject /course	Mid Sem Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	240101	DC	Introduction to Artificial Intelligence	50	10	20	20		-	-	100	4	-	-	4	[illegible]	[illegible]
2.	230102	DC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2:1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				250	50	100	100	120	40	40	700	14	03	04	19	-	-

Induction program of first three weeks : Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visit/Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations

[$] 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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination					
Theory				Lab	Theory			Lab		
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO		
		Offline	Online							
04	03	07	03	02	04	03	10	02	19	Credits
[illegible]	15.79%	36.84%	15.79%	10.53%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

II Semester

For batch admitted in academic session 2021 – 2022

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	$ Proficiency in subject /course	Mid Sem. Exam	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	230201	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
2.	220202	DC	Sensor Technology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
3.	230202	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	PP
4.	230203	DC	Object Oriented Programming and Methodology	50	10	20	20	60	20	20	200	3	-	2	4	Blended (2/1)	AO
5.	100016	HSMC	Technical Language	50	10	20	20	-	-	-	100	3	-	-	3	Blended (2/1)	PP
6.	100017	HSMC	Language Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
			Total	250	50	100	100	240	80	80	900	14	01	08	19	-	-

Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

$ 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 **OB**: Open Book **PP**: Pen Paper **SO**: Submission + Oral

Mode of Teaching					Mode of Examination				
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
-	-	10	05	04	12	03	-	04	19
		52.63%	26.32%	21.05%	63.16%	15.79%		21.05%	100%

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. in Information Technology (Artificial Intelligence and Robotics)

III Semester

(for batch admitted in academic session 2020 – 21)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam	Proficiency in subject course	Mid Sem Exam	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	250106	BSC	Probability and Random Process	50	10	20	20	-		-	100	3	1	-	4	Offline	PP
2.	240301	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
3.	240302	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	240303	DC	Computer Networks and Protocols	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
5.	240304	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
6.	240305	DLC	Python Programming Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO
7.	240306	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentorship	SO
8.	200XXX	OEC	Novel Emerging Course (Lab Learning)													Interactive	SO
9.	240307	DLC	Summer Internship Project-I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO
Total				250	50	100	100	290	100	60	950	11	05	14			
10.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

* 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

Mode of Teaching						Mode of Examination					
Theory				Lab	NEC	Theory			Lab	SIP/ SLF/ NEC	Total Credits
Offline	Online	Blended		Offline	Interactive	PP	A+O	MCQ	SO	SO	
		Offline	Online								
04	-	08	04	06	01	16	-	-	06	01	23
				34%		69.56%			26.09%	4.35%	Credits %

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

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
(along with the Course Outcomes)
of
B. Tech. III Semester
(Information Technology)
(Batch Admitted in 2021-22)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER SYSTEM ORGANIZATION
160311

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVE

- 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 Newman 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 Microprogrammed Control.

Unit -III

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

Unit -IV

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

Transfer), 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, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- 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. compare different memories.

CO3. apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems.

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 INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
160312

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and Additional Real World Problems on Divide and Conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling Salesman Problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix Chain Multiplication.

Unit-V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate a familiarity with major algorithms and data structures.
CO2. idenify important algorithmic design paradigms and methods of analysis.
CO3. analyze the performance of algorithms.
CO4. compare various algorithm design techniques.
CO5. select the design technique to solve any real world problem.
CO6. design efficient algorithm using various design techniques.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
160313

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL), Triggers.

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate the concepts of different types of database system.

CO2. apply relational algebra concepts to design database system.

CO3. make use of queries to design and access database system.

CO4. analyze the evaluation of transaction processing and concurrency control.

CO5. determine the normal form of the relation.

CO6. design a ER diagram/database system for a real world application.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEM
160314

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

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

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. tell the basic concept of operating systems.

CO2. explain the working procedure of the operating system.

CO3. analyze the various operating system problems and issues.

CO4. develop the solutions for various operating system problems and issues.

CO5. measure the performance of various scheduling and allocation techniques.

CO6. test the working of various scheduling and allocation techniques.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA PROGRAMMING LAB
160315

L	T	P	Total Credits
-	1	2	2

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use Java SDK environment to create, debug and run simple Java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package access, Variables and data types, Conditional and looping constructs, Arrays.

Unit-II

Object-oriented programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading methods, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Wrapper classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for various controls, such as label, choice, list, checkbox, etc., Dialogs and frames using menus.

Basic concepts of networking: Working with URLs, Concepts of URLs and Sockets. Basics of database connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.

COURSE OUTCOMES

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

CO1. tell the available features in Java programming language.

CO2. illustrate Java programming concepts for solving problems.

CO3. make use of the Java programming methods for connecting the various databases.

CO4. test for bugs in a software application written in the Java programming language.

CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.

CO6. build a project for application development using Java programming language.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

Syllabi
(along with the Course Outcomes)
of
B. Tech. III Semester
Information Technology (Internet of Things (IoT)/Artificial Intelligence and Robotics)
(Batch Admitted in 2021-22)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
230301/240301

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and Additional Real World Problems on Divide and Conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix Chain Multiplication

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit-V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate a familiarity with major algorithms and data structures.

CO2. idenify important algorithmic design paradigms and methods of analysis.

CO3. analyze the performance of algorithms.

CO4. compare various algorithm design techniques.

CO5. select the design technique to solve any real world problem.

CO6. design efficient algorithm using various design techniques.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEM
230302/240302

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

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

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. tell the basic concept of operating systems.

CO2. explain the working procedure of the operating system.

CO3. analyze the various operating system problems and issues.

CO4. develop the solutions for various operating system problems and issues.

CO5. measure the performance of various scheduling and allocation techniques.

CO6. test the working of various scheduling and allocation techniques.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS AND PROTOCOLS
230303/240303

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

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

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

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- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication, Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features-Numbering System, Flow Control, Error Control, Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control-Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer-Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer-Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.
- TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
- Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
- TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

COURSE OUTCOMES

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

CO1. explain the fundamental concepts of computer network.

CO2. illustrate the basic taxonomy & terminologies of computer network protocols.

CO3. develop a concept for understanding advance computer network.

CO4. build the skill of IP addressing and routing mechanism.

CO5. predict the performance of computer network in congestion and internet.

CO6. construct the network environment for implementation of computer networking concept.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
230304/240304

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Database Approach v/s Traditional File Approach, Advantages of Database System, Database Users and Administrator, Database System Environment, Application Architectures, Schemas, Instances, Data Independence, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Entities and Relationship Model: Entity types, Entity sets, Attributes and Keys, Relationship Types and Sets, Constraints, Design issue, E-R Diagram, Weak Entity Sets.

Unit-II

Relational Model: Structure of Relational Databases: Relation, Attribute, Domain, Tuples, Degree, Cardinality, Views, Database Relations, Properties of Relations, Attributes, Keys, Attributes of Relation, Domain Constraints, Integrity Constraints.

Relational Algebra: Concepts and Operations: Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Purpose of SQL, Data Definition Language (DDL) Statements, Data Manipulation Language (DML) Statements Update Statements & Views in SQL, Data Control Language (DCL), Triggers.

Unit-IV

Relational Database Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependency, The Process of Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition, Desirable Properties of Decomposition: Dependency Preservation, Lossless Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Management: Transaction Concept, Transaction State, Concurrent Executions, Serializability: Conflict and View Serializability, Concurrency Control: Lock-Based Protocol, Recovery: Log-Based Recovery.

RECOMMENDED BOOKS

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

COURSE OUTCOMES

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

CO1. demonstrate the concepts of different types of database system.

CO2. apply relational algebra concepts to design database system.

CO3. make use of queries to design and access database system.

CO4. analyze the evaluation of transaction processing and concurrency control.

CO5. determine the normal form of the relation.

CO6. design a ER diagram/database system for a real world application.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
240305

L	T	P	Total Credits
-	-	2	1

COURSE OBJECTIVES

- Implement an algorithm in Python by using standard programming constructs such as, functions, modules, aggregated data (arrays, lists, etc.)
- Explain the output of a given Python program and identify and correct errors in a given Python program
- Write programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

Unit-I

Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator; Boolean Expressions; Control Structures; Selection Control, Iterative Control. Lists & tuples: List Structures; Lists in Python, Iterating over Lists in Python.

Unit-II

Functions: Arguments in functions; Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Variable Scope; Modular design Modules; Top-Down Design Python Modules; File Handling Operation in file: Reading, Writing and appending in Text Files.

Unit-III

String Processing; Dictionaries and sets operations; Exception Handling: Exceptions Data Collections applying lists etc.

Unit-IV

Introduction to Object Oriented Programming, Class, Objects, Encapsulation, Data abstraction, Inheritance, Polymorphism.

Unit-V

Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

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RECOMMENDED BOOKS

- C. Dierbach, Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus (1st ed.), Wiley, 2015. ISBN 978-8126556014.
- Yashavant Kanetkar, Let Us Python (1st ed.), BPB Publishers, 2019. ISBN 978-9388511568

COURSE OUTCOMES

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

CO1. define basics syntax and features of python programming language

CO2. solve computational problem using python language.

CO3. take part in online coding platforms.

CO4. inspect the python program for errors.

CO5. design a program using the features of object oriented concept.

CO6. construct the python code for real world problem using the libraries.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN AND THINKING LAB
230305

L	T	P	Total Credits
-	-	2	1

PREREQUISITES

We assume that you are already familiar with the basics of C and C++. Knowledge in other programming language especially the OOP is an added advantage. A basic understanding of microcontrollers and electronics is also expected.

COURSE OBJECTIVE:

The students will:

- Learn the basics of electronics, including reading schematics (electronics diagrams)
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Program basic Arduino examples
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Connect the Arduino microcontroller to a serial terminal to understand communication and stand-alone use
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

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Unit-I

Introduction: embedded system, Understanding Embedded System, Overview of basic electronics and Digital electronics, Microprocessor vs Microcontroller, Common features of Microcontroller, Comparison between different types of microcontrollers.

Unit-II

Arduino: introduction, Pin Configuration and Architecture, Device and Platform Features, Concept of Digital and Analog ports, Arduino Interfacing Board, Introduction to Embedded C and Arduino Platform.

Unit-III

Basic Concepts and Functions: Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, analogRead() function, Arduino Interrupts.

Unit-IV

Arduino Time and Displays: Incorporating Arduino time, delay() function, delay Microseconds() function, millis() function, micros() function. Working with Serial Monitor, Line graph via serial monitor, interfacing 8 bit LCD to Arduino. Fixed one line static message display, Running message display using the LCD Library of Arduino.

Unit-V

Arduino Sensors and Secondary Integrations: Humidity Sensor, Temperature Sensor, Water Detector/ Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch (Relay switches). Types of Relay, Controlling Electrical appliances with electromagnetic relays.

RECOMMENDED BOOKS:

- Arduino for Dummies, by John Nussey (2013)

References:

1. Arduino Projects for Dummies, by Brock Craft (2013)
2. Programming Arduino – Getting Started with Sketches, Simon Monk (2016)
3. Programming Arduino - Next Steps, by Simon Monk (2016)

COURSE OUTCOMES

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

CO1. define the basic concept of Embedded System.

CO2. describe the basic principles of Arduino programming and IDE.

CO3. familiarize with different types of sensors and related systems.

CO4. design, implement, debug and test programs/ system.

CO5. design and develop Smart systems applications.

CO6. build Arduino board using different sensors.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XII

List
of
Experiments and Skill Based Mini Project
for
Laboratory Courses
B.Tech III Semester
(Batches admitted in 2021-22)
(Information Technology/Internet of Things (IoT)/ Artificial Intelligence and Robotics)
Under Flexible Curriculum

[ITEM IT -16]

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
160312/230301/240301

LIST OF PROGRAMS

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

COURSE OUTCOMES

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

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

CO2. demonstrate basic algorithms and different problem solving strategies.

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

CO4. analyze running times of algorithms using asymptotic analysis.

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

CO6. design and implement optimization algorithms in specific applications.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
160312/230301/240301

LIST OF SKILL BASED MINI PROJECT

1. Implement tree traversal techniques like pre-order, post-order and in-order.
2. Implementation of divide and conquer based merge sort algorithm, quick sort algorithm.
3. Implementation of divide and conquer based matrix multiplication algorithm.
4. Implement the greedy approach for single source shortest path.
5. Design a program for finding minimum cost tree for traversing all nodes of a graph.
6. Implement the Knapsack problem and 0/1 Knapsack problem.
7. Implement the travelling salesman problem using dynamic programming.
8. Implement matrix chain multiplication using dynamic programming.
9. Design a program for 4 and 8 queen problem.
10. Implement a program for polynomial reduction.
11. Implement a phone directory application using doubly-linked lists.
12. Implement the movement of knight in chess game.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
160313/ 230304/240304

LIST OF PROGRAMS

While creating tables, databases the name should have a prefix of your roll number.

Ex. If your roll number is 55 then every table name must start with 55 TABLE_NAME. 1. Write program name 2. Write description of command used for executing the query. 3. Write commands in bold letters. 4. Take the screenshot of the output.

1. Implementation of DDL commands of SQL with suitable examples.
   a. Create table
   b. Alter table
   c. Drop Table
2. Implementation of DML commands of SQL with examples.
   a. Insert
   b. Update
   c. Delete
3. Implementation of different type of function with suitable example
   a. Number function
   b. Aggregate function
   c. Character function
   d. Conversion function
   e. Data function
4. Implementation of different type of operators in SQL.
   a. Arithmetic operators
   b. Logical operators
   c. Set operator
   f. Comparison Operator
   g. Special operator
5. Implementation of type of joins.
   a. Inner Join
   b. Outer Join
   c. Natural Join etc.
6. Study and implementation of
   a. Group by & having clause
   b. order By clause
   c. Indexing
7. Study of Implementation of
   a. Sub queries
   b. Views
8. Study & implementation of different type of constraints.
9. Study & implementation of database backup & recovery command.
10. Study & implementation of Rollback, commit, savepoint.

11. Creating Database /Table Space
    a. Managing Users: Create User, Delete User
    b. Managing roles: Grant, Revoke.

COURSE OUTCOMES

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

CO1. construct database schema for a given problem domain.

CO2. apply integrity constraints on a database schema using a state-of-the-art RDBMS.

CO3. apply SQL queries using DDL and DML to design and access database systems.

CO4. make use of operators and functions used in query.

CO5. distinguish Tables and Views for database systems.

CO6. develop a small project for a real world scenario.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATABASE MANAGEMENT SYSTEM
160313/ 230304/240304
LIST OF SKILL BASED MINI PROJECT

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Design ER-Diagram, Create Schema and insert at least 5 records for each table. Add appropriate database constraints

Mini Skill Project 1

Consider the following schema for a Library Database:
BOOK (Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS (Book_id, Author_Name)
PUBLISHER (Name, Address, Phone)
BOOK_COPIES (Book_id, Programme_id, No-of_Copies)
BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

Mini Skill Project 2

Consider the following schema for Order Database:
SALESMAN (Salesman_id, Name, City, Commission)
CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)
ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)
Write SQL queries to

1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

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Mini Skill Project 3

Consider the schema for Movie Database:
ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)

Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

Mini Skill Project 4

Consider the schema for College Database:
STUDENT (USN, SName, Address, Phone, Gender)
SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
COURSE (Subcode, Title, Sem, Credits)
IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = 'Outstanding'
If FinalIA = 12 to 16 then CAT = 'Average'
If FinalIA< 12 then CAT = 'Weak'
Give these details only for 8th semester A, B, and C section students.

Mini Skill Project 5

Consider the schema for Company Database:
EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo,DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

Write SQL queries to

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Mini Skill Project 6

A university registrar's office maintains data about the following entities:
(a)courses, including number, title, credits, syllabus, and prerequisites;
(b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
(c) students, including student-id, name, and program; and
(d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.
Construct an E-R diagram forthe registrar's office. Document all assumptions that you make about the mapping constraints.

Mini Skill Project 7

Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

Mini Skill Project 8

Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

Mini Skill Project 9

Design an E-R diagram for keeping track of the exploits of your favourite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

Mini Skill Project 10

Consider a database used to record the marks that students get in different exams of different course offerings.
a. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
b. Construct an alternative E-R diagram that uses only a binary relationship between students and course-offerings. Make sure that only one relationship exists between a particular student and course-offering pair, yet you can represent the marks that a student gets in different exams of a course offering.

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DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA PROGRAMMING LAB
160315

LIST OF PROGRAMS

1. Write a program to accept two numbers (int) as command line arguments and print their Sum.
2. Write a program to find the average and sum of the N numbers Using Command line argument.
3. Write a program to Demonstrate Type Casting.
4. Write a program to find the number of arguments provide at runtime.
5. Write a program to print Fibonacci series without using recursion and using recursion.
6. Write a program to check prime numbers and palindrome numbers.
7. Write a program to sort an array of elements using bubble sort algorithm.
8. Write a program to sort an array of elements using insertion sort algorithm.
9. Write a non-static function in java that prints the sum of two numbers.
10. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
11. WAP to handle the Exception using try and multiple catch block.
12. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
13. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text field when the button "Compute" is clicked
14. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every first second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

COURSE OUTCOMES

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

CO1. tell the available features in Java programming language.

CO2. illustrate Java programming concepts for solving problems.

CO3. make use of the Java programming methods for connecting the various databases.

CO4. test for bugs in a software application written in the Java programming language.

CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.

CO6. build a project for application development using Java programming language.

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JAVA PROGRAMMING LAB
160315

LIST OF SKILL BASED MINI PROJECT

1. Design and implementation of Registration page for a system.
2. Design and implementation of Currency Converter.
3. Design and implementation of Number Guessing Game.
4. Design and implementation of Snake Game in Java.
5. Design and implementation of tic-tac-toe game.
6. Design and implementation of User name- password page for a system.
7. Design and implementation of database connectivity using JDBC with SQL.
8. Design and implementation of database connectivity using JDBC with MS Access.
9. Update, deletion and search of items in a database using a web page/front end.
10. Display of Database table in a webpage.
11. Design of dynamic web pages with backward and forward functions.
12. Display of a video file in a web page.
13. Display of Graph Representation in a web page.
14. Email notification using Java Library.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN AND THINKING LAB
230305

LIST OF PROGRAMS

1. Introduction to Arduino Board and Arduino IDE (Installation and Setup)
2. Write a Program to Blink LED (Turn an LED on and off).
3. Write a Program to demonstrate the use of analog output to fade an LED.
4. Write a Program to read an analog input and prints the voltage to the serial monitor.
5. Write a Program to count the number of button pushes.
6. Write a Program to Control an LED using Button.
7. Write a program to detect object using IR Obstacle Sensor.
8. Write a program to detect presence of Gas using GAS Sensor.
9. Write a Program to Control Electronic Appliances using RELAY SHIELD Sensor.
10. Write a Program to measure Temperature and Humidity using DHT11 Sensor.
11. Write a program to detect motion using Motion Sensor (PIR sensor).
12. Write a Program to detect presence of smoke using Smoke Sensor.
13. Write a Program to play melody with a Piezo speaker.

COURSE OUTCOMES

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

CO1. define the basic concept of Embedded System.

CO2. describe the basic principles of Arduino programming and IDE.

CO3. familiarize with different types of sensors and related systems.

CO4. design, implement, debug and test programs/ system.

CO5. design and develop Smart systems applications.

CO6. build Arduino board using different sensors.

LIST OF SKILL BASED MINI PROJECT

1. Intelligent home locking system.
2. Intelligent water level management system.
3. Home automation using RFID.
4. Real time clock-based home automation.
5. Intelligent Automatic Irrigation System

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
240305

LIST OF PROGRAMS

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find the factorial of a number using recursion.
8. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.
9. WAP to read content of a file and write into another file.
10. Write a python program to define a module and import a specific function in that module to another program.

COURSE OUTCOMES

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

CO1. write, test, and debug simple Python programs.

CO2. solve computational problem using python language.

CO3. familiar with basics syntax and features of python programming language.

CO4. use Python lists, tuples, dictionaries for representing compound data.

CO5. design a program utilizing the features of object oriented concept.

CO6. utilize some of the libraries available for solving problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING LAB
240305

LIST OF SKILL BASED MINI PROJECT

1. Implement a calculator using Tkinter library.
2. Design and implementation of Animal Kingdom Classification.
3. Design and implementation of Currency Converter.
4. Design and implementation of Snake Game in Java.
5. Design and implementation of a real-time, User friendly Currency Converter.
6. Design and implementation of a File Manager which supports various types of files.
7. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
8. Design any game of your choice like tic-tac-toe etc.
9. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
10. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
11. Design a program for spam filtering.
12. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
13. Implement countdown clock and timer.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XIII

Scheme & Syllabi of B. Tech I Semester (Batch Admitted in 2022-23) (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics/ Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning) Under Flexible Curriculum

[ITEM IT -18]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester (Information Technology)

(for batch admitted in academic session 2022 – 23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	160112	ESC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
2.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
3.	100020	ESC	Basic Civil Engineering & Mechanics	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
4.	100021	ESC	Basic Mechanical Engineering	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	MCQ
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
6.	160111	DLC	IT workshop	-	-	-	-	60	20	20	100	-	-	4	2	Offline	SO
Total				**250**	**50**	**100**	**100**	**180**	**60**	**60**	**800**	**11**	**04**	**08**		-	-
7.	1000004	MAC	Engineering Chemistry	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

$ 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 **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
-	03	08	04	04	03	03	09	04	19
-	15.79%	42.11%	21.05%	21.05%	15.79%	15.79%	47.37%	21.05%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology
Scheme of Evaluation
B. Tech. in Internet of Things (IoT)
I Semester

(for batch admitted in academic session 2022– 23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot				L	T	P			
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation								
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assign ment		Lab work & Sessional	Skill Based Mini Project							
1.	230101	DC	Introduction to Internet of Things (IoT)	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	ESC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				**250**	**50**	**100**	**100**	**120**	**40**	**40**	**700**	**14**	**03**	**04**		-	-
6.	1000003	MAC	Engineering Physics	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

$ 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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
04	03	07	03	02	04	03	10	02	19
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.63%	10.53%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology
Scheme of Evaluation
B. Tech. in Information Technology (Artificial Intelligence and Robotics)
I Semester

(for batch admitted in academic session 2022 – 23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per Week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P			
				End Sem. Exam.	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab work & Sessional	Skill Based Mini Project							
1.	240101	DC	Introduction to Artificial Intelligence	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	230102	ESC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				**250**	**50**	**100**	**100**	**120**	**40**	**40**	**700**	**14**	**03**	**04**	[redacted]	-	-
6.	1000003	MAC	Engineering Physics	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ

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

$ 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 OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
04	03	07	03	02	04	03	10	02	19
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.63%	10.53%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester *(Artificial Intelligence (AI) and Data Science)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	[5]Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	270101	DC	Introduction to Artificial Intelligence & Data Science	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	270102	ESC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				**250**	**50**	**100**	**100**	**120**	**40**	**40**	**700**	**14**	**03**	**04**	**19**	-	-
6.	1000003	MAC	Engineering Physics	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	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.

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

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

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
04	03	07	03	02	04	03	10	02	19
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.63%	10.53%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester *(Artificial Intelligence (AI) and Machine Learning)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam.
				Theory Slot				Practical Slot									
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation			L	T	P			
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project							
1.	280101	DC	Introduction to Artificial Intelligence & Machine Learning	50	10	20	20	-	-	-	100	4	-	-	4	Blended (3/1)	MCQ
2.	280102	ESC	Introduction to Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	AO
3.	100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	MCQ
4.	250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP
5.	100015	HSMC	Energy, Environment, Ecology & Society	50	10	20	20	-	-	-	100	3	-	-	3	Online	MCQ
Total				**250**	**50**	**100**	**100**	**120**	**40**	**40**	**700**	**14**	**03**	**04**	**19**	-	-
6.	1000003	MAC	Engineering Physics	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	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

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

Mode of Teaching					Mode of Examination				Total Credits
Theory				Lab	Theory			Lab	
Offline	Online	Blended		Offline	PP	A+O	MCQ	SO	
		Offline	Online						
04	03	07	03	02	04	03	10	02	19
21.05%	15.79%	36.84%	15.79%	10.53%	21.05%	15.79%	52.63%	10.53%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER PROGRAMMING
160112/230102/270102/280102

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To familiar with program readability/understanding including program style/formatting and self-documenting code.
- To familiar with debugging process.
- To design and implement basic programming solutions including statements, control structures, and methods.

Unit I

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

Unit II

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

Unit III

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

Unit IV

Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning

address, Recursion, Structures & Union, Pointer to Structure, Self-Referential Structures, Dynamic memory allocation by malloc/calloc function, Storage Classes.

Unit V

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

RECOMMENDED BOOKS

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

COURSE OUTCOMES

After completion of the course students would be able to:

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

CO2. describe the basic principles of imperative and structural programming.

CO3. develop a pseudo-code and flowchart for a given problem.

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

CO5. design, implement, debug and test programs.

CO6. design computer programs to solve real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER PROGRAMMING
160112/230102/270102/280102
LIST OF EXPERIMENTS

1. Write a C program to add two numbers and display its sum.
2. Write a C program to input two number from the user and display the multiplication of these numbers.
3. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
4. Write C program to realize the following expressions:
   a. $V = u + at$
   b. $S = ut+1/2a$
   c. $T=2*a+\sqrt{b}+9c$
5. Write a program to take input of name, rollno and marks obtained by a student in 5 subjects of 100 marks each and display the name, rollno with percentage score secured.
6. Write a program to swap values of two variables with and without using third variable.
7. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
8. Write a program to find the largest of three numbers using ternary operators.
9. Write a program to find the roots of quadratic equation.
10. Write a Program to Check Whether a Number is Prime or not.
11. Write a program to compute grade of students using if else ladder as per MITS norms.
12. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
13. Write a program to print the sum of digits of a number using for loop.
14. Write a program to display the following pattern using for loops.

(i)
```
* * * * *
* * * *
* * *
* *
*
```

(ii)
```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

(iii)
```
    1
   1 2
  1 2 3
 1 2 3 4
1 2 3 4 5
```

(iv)
```
A
A B
A B C
A B C D
A B C D E
```

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(v)

```
    *
   ***
  *****
 *******
*********
```

(vi)

```
*********
 *******
  *****
   ***
    *
```

(vii)

```
    1
   121
  12321
 1234321
123454321
```

(viii)

```
ABCDEF
ABCDE
ABCD
ABC
AB
A
```

(ix)

```
1
123
12345
123
1
```

(x)

```
*******
***   ***
**     **
*       *
```

(xi)

```
******
   *
  *
 *
*
******
```

(xii)

```
*****
*   *
*   *
*   *
*****
```

15. Write a program to insert 10 elements into an array and print the elements of the array.
16. Write a program to calculate factorial of a number using recursion.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO COMPUTER PROGRAMMING
160112/230102/270102/280102
LIST OF SKILL BASED MINI PROJECT

1. Write a program to obtain the sum of the first two even digit and last two add digits of integer number given by user .Number has at least 8 digit.
2. Write a program to obtain a number N and increment its value by 1 if the number is divisible by 4 otherwise decrement its value by 1 until we get a prime number.
3. Consider the following 4×4 pattern:

   1 2 4 7

   3 5 8 11

   6 9 12 14

   10 13 15 16

   You are given an integer N. Write a program to print the N×N pattern of the same kind (containing integers 1 through N^2).
4. Following conditions are given based on three subjects marks
   a. Physics marks must be greater than 50
   b. Chemistry marks must be greater than 80
   c. English marks must be greater than 70

   Students is awarded grade 10 if all three conditions are met. Grade 9 is given if conditions a and b are met. Grade 8 is given if conditions b and c are met. Grade 7 is given if a and c are met. Grade is 6 if only one condition is met . Grade is 5 if none of the three conditions are met. Write a program to display the grade of students , based on the values of physics , chemistry and English , given by user.

5. Ram and Shyam are playing a game. Ram initially has the number **A** and Shyam has the number **B**. There are a total of **N** turns in the game, and Ram and Shyam alternatively take turns. In each turn the player whose turn it is, multiplies his or her number by 2. Ram has the first turn. Suppose after all the **N** turns, Ram's number has become **C** and Shyam's number has become **D**. Write a program to calculate the integer division of the maximum number among **C** and **D** by the minimum number among **C** and **D**.

6. An array A of N positive numbers is given. Write a program to find the number of subarrays for which the sum and product of elements are unequal.
7. There's an array A consisting of N non-zero integers $A_{1..N}$. A subarray of A is called alternating if we take any two adjacent elements in it, then one of them should be even and the other should be odd. For each x from 1 to N, write a program to compute the length of the longest alternating subarray that starts at x - that is, a subarray $A_{x..y}$ for the maximum possible $y \geq x$. The length of such a subarray is y-x+1.
8. Given an array $A_1, A_2, ..., A_N$, count the number of subarrays of array A which are non-decreasing. A subarray A[i,j], where $1 \leq i \leq j \leq N$ is a sequence of integers $A_i, A_{i+1}, ..., A_j$. A subarray A[i,j] is non-decreasing if $A_i \leq A_{i+1} \leq A_{i+2} \leq ... \leq A_j$. Write a program to count the total number of such subarrays.
9. Two strings A and B are given, each consisting of lower case alphabets.
   Write a program to find whether it is possible to choose some non empty strings s1 and s2 where s1 is a substring of A, s2 is a substring of B such that s1 + s2 is a palindromic string. Here '+' denotes the concatenation between the strings. And if there are such strings S1 and S2 then print S1+S2.
10. There are N students standing in a row and numbered 1 through N from left to right. You are given a string S with length N, where for each valid i, the i-th character of S is 'x' if the i-th student is a girl or 'y' if this student is a boy. Students standing next to each other in the row are friends .The students are asked to form pairs for a project work. Each pair must consist of a boy and a girl. Two students can only form a pair if they are friends. Each student can only be part of at most one pair. Write a program to find the maximum number of pairs that can be formed.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO INTERNET OF THINGS (IoT)
230101

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To understand basic terminology of Internet of Things.
- To understand technology behind interaction between things.
- To understand basic terminology of Internet of Things.

Unit I

Internet of things (IoT) : Introduction, Evaluation of IoT concept, Definition, Key features and components, IoT Building block, IoT Characteristics, Advantages and Disadvantages.

Unit II

IoT Applications, IoT application structures and driver technologies : collection, transmission, processing, managing, utilization phase, Telematics and Telemetry, Telematics vs IoT, Machine-to-Machine communication, M2M vs IoT, IoE, IIoT, V2V, V2X.

Unit III

IoT hardware and software, Study of IoT Sensors, Actuators, Wearable electronics, Standard devices, Concept of Cloud, Edge, Fog and Roof computing in IoT, Introduction to communication, Components of communication system, Modes of communication, Types of data transmission, IoT communication models : Device-to-Device, Device-to Cloud, Device-to-Gateway, and Back-End Data-Sharing, IoT Connectivity and Management.

Unit IV

Introduction to Internet and Networking Protocol, IoT protocols, Types of IoT Networks, Introduction of WSN, RF wireless sensors, RFID, WiFi, Bluetooth, IP Based Cellular Networks & 3G, 4G.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit V

IoT Challenges: Interoperability, Precision, Data volume and scalability, Internet connectivity, **IoT Security**: Security vulnerabilities in overall IoT system, Security vulnerabilities at different layers of IoT architecture, IoT Privacy and Trust, Standardization gap.

RECOMMENDED BOOKS

- Internet of Things from Hype to Reality, The Road to Digitization, Ammar Rayes and Samer Salam, Second Edition, Springer
- Internet of Things (IoT) Technology, Economic View And Technical Standardization, Etienne Schneider, Version 1.0, ILNAS
- Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, Springer
- Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, McGraw Hill Education

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COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define the basic terminology of Internet of Things.

CO2. illustrate the role of communication in IoT.

CO3. identify and use various protocols devices that are used in IoT.

CO4. classify networking, cloud and fog computing concept for data management.

CO5. explain the challenges, security and privacy.

CO6. discuss different IoT enabled techniques behind interaction between things.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO ARTIFICIAL INTELLIGENCE
240101

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basic representation and reasoning paradigms used in AI.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming , Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time, etc, Data Types: Categorical/Nominal/Ordinal, Etc..., Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Introduction to Optimization: Evolutionary Algorithms, Genetic Algorithms: Basic Concepts, Optimization, Need for Optimization, Membership Functions.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit IV

Introduction to Intelligent Agent, Characteristics and functionalities, Introduction to Expert System, Roles of Expert Systems, Logic and Reasoning in AI: Introduction to Logic, Basic of Boolean Algebra, Logic Gates, Propositional and Predicate Logic: Interpretation of Formulas, Syntax and Semantics of an Expression, Inference Rules.

Unit V

Artificial Intelligence in Real World: Speech Processing, Natural Language Processing, Planning, Engineering and Expert Systems, Fuzzy Systems, Models of Brain and Evolution, AI in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Gaming, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence.

CO2. relate various computer components used in Artificial Intelligence.

CO3. identify different logical and reasoning techniques used in AI.

CO4. analyze the general approach of optimization, intelligent agent and expert system.

CO5. analyze the general approach of machine learning.

CO6. build AI enabled intelligent procedures for solving real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

IT WORKSHOP

160111

L	T	P	Total Credits
-	-	4	2

COURSE OBJECTIVES:

- To make use of computers for various purposes like surfing the net, sending/ receiving emails, preparation of various documents and presentations, preparing small databases, maintenance of accounts.
- To acquire the knowledge of computer system, mother board and its processing unit.
- To be aware of different memories, windows installation, hardware and software troubleshooting.

Unit-I

Computer Hardware: Introduction to Hardware Peripherals like RAM, ROM, Keyboard, Hard disk drive, Mouse , Processors, Generation of processor , Working of SMPS , Study of various ports, Assembly and Disassembly of Computer, Study of Networking Cable and it's types, Installation and Partition of Hard Disk, Troubleshooting & Fault finding.

Unit-II

Operating System and software installations: Introduction to Operating System, Types of Operating System (Windows and Linux), Evolution of Operating System, Introduction of Software, Types of Software, Installation steps for Operating System (Windows, Linux etc), Creating Virtual Machine using VMware/ VirtualBox.

Unit-III

Word & Excel Orientation: Overview of Microsoft office word / Excel, New Features of Microsoft Office, Working with Documents in Microsoft Word /Excel, Saving the File, Formatting the Text, Alignment of Text, Applying Fonts, Spell Checking, Inserting Header and Footer , Charts and Graphics in Microsoft Word/Excel, Working with Tables, functions and Macros in Microsoft Word/Excel, Validating Data in Microsoft Excel, Using formulae in Excel, Creating project/certificates/Newsletter using Word.

PowerPoint Presentation: Introduction to Microsoft PowerPoint, Use of Standard Formatting toolbar, Working with Charts and Tables, Editing slides, Changing templates, Slide Layouts, Inserting clipart & Pictures into slide, Slide Transitions, Animation, Inserting sound and movies into slides, Create & Deliver dynamic presentation.

Unit-IV

Computer Application: Microsoft Disk Operating System (MS-DOS): Internal Commands, External Commands, Batch File etc. Overview of Linux, Common Linux Features, **Essential Linux commands**, Advantage of Linux, Creating E-mail Account, E-mail Writing , Blog Writing, Net Surfing and Chatting ,Customize Web Browser with the LAN proxy setting, Bookmarks, Search Toolbars and Pup up Blockers, Install Antivirus Software, Configure personal firewall and Window update, Customize browser to block pop ups, Cyber Hygiene.

Unit-V

Internet: Introducing the Networking concept using LAN & WAN, Introduction, Evolution and Uses of Internet, Concepts of Web Browser, Web Page and Web Site, Study of various Internet based services like Email, Social Network, Chat, Introduction to Cyber Security and Cyber Laws.

Server: Introduction to Server, Difference between server and normal desktop, Evolution of servers, Study of various servers. Web designing using HTML/CSS.

RECOMMENDED BOOKS

- Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
- The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech.
- Introduction to Information Technology, ITL Education Solutions Limited, Pearson Education.
- PC Hardware and A+ Handbook - Kate J. Chase PHI (Microsoft)

COURSE OUTCOMES

After completion of the course student would be able to:

CO1. define the basic concept and structure of computer hardware and networking.

CO2. demonstrate installation of windows and connections through ports at basic level.

CO3. identify the existing configuration of the computers and peripherals.

CO4. apply the knowledge about computer peripherals to identify/rectify problems onboard.

CO5. explain the concept of Memory, Motherboard, Bus and SMPS.

CO6. elaborate the data backup mechanism, restore operations on computer and update application software.

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DEPARTMENT OF INFORMATION TECHNOLOGY

IT WORKSHOP
160111
LIST OF PROGRAMS

1. Design Resume on Word.
2. Prepare powerpoint presentation on one latest technology.
3. Write a request and apology email.
4. Run MS-DOS commands/Linux commands.
5. Study of Computer Hardware (RAM, ROM, Keyboard, Hard disk drive, Mouse, processors, hard disk etc).
6. Installation and partition of hard disk.
7. Installations of OS (Windows/Linux etc).
8. Disassemble and assemble the PC.
9. Study of PC troubleshooting.
10. Creating Virtual Machine using VMWARE.
11. Design Webpage using HTML & CSS.

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DEPARTMENT OF INFORMATION TECHNOLOGY

IT WORKSHOP
160111

LIST OF SKILL BASED MINI PROJECT

1. Using UCI Heart Disease Data perform a multivariate numerical data analysis using correlation on 25 out of 76 attributes in excel workbook. Present your results using various charts and graphs available in MS Excel workbook.
2. Demonstrate and compile a script (in dos/C/bash shell/terminal) to send a file from one system to another using LAN and ftp protocol.
3. Use C language to implement a payroll system for MITS employees. The system should prompt a list to input the data, view list of employees and display annual estimated tax @10% per annum of the total salary. Input employee details including name, emp no, dob, monthly basic salary, Gross Pay, DA and HRA. Save the details in a file and retrieve the data as needed.
4. Use C language to implement a Railway reservation system. The system should prompt a list to print number of passengers and the train they are travelling, option to input data of passenger and train.
5. Use excel workbook to predict to predict students' end-of-term performances using the Higher Education Students Performance Evaluation Dataset from Kaggle.
6. Use excel workbook to implement inner joins and outer joins on multiple tables to demonstrate its use.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
270101

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basics of Data Science (DS) and machine learning (ML) and how DS is different from ML.
- To investigate applications of AI and DS techniques in social media analysis, mobile and IoT analysis, time series analysis, security and privacy for data analytics.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non-Structure, Semi Structure, Images, Video, Temporal, Real Time. Data Types: Categorical/Nominal/Ordinal, Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification.

Unit IV

Introduction and importance of Data Science, modelling process in Data Science, various tools for data analytics, data handling and visualization, data scientist roles and responsibilities, privacy and security in Data Science.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Unit V

Artificial Intelligence and Data Science in Real World: Speech Processing, Natural Language Processing, Satellite Data Analysis, manufacturing industry, logistic industry, retail industry. AI and DS in Healthcare, Defence and Agriculture, Cyber Security, Agriculture, E-Commerce, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence.

CO2. relate various computer components used in Artificial Intelligence.

CO3. identify different logical and reasoning techniques used in AI.

CO4. examine the pattern discovery, data handling and data visualization.

CO5. analyze the general modelling process in Data Science.

CO6. solve the real world problems using the concepts of AI & DS.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

280101

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basics of Artificial Intelligence (AI) and machine learning (ML).
- To investigate applications of AI and ML techniques in social media analysis, mobile and IoT analysis, time series analysis, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional Vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time. Data Types: Categorical/Nominal/Ordinal, Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Supervised Learning: Linear and Logistic Regression: Linear models for classification, Sigmoid, Logistic regressions with single and multiple variables, Polynomial regression.

Unit IV

Unsupervised Learning: Clustering, Common distance measures, Hierarchical algorithms – agglomerative and divisive, partitioning algorithms – k-means and derivatives; Design and Analysis of Machine Learning Experiments: Guidelines for machine learning experiments, Factors, Response, and Strategy of experimentation, Cross-Validation and Resampling methods, measuring classifier performance.

Unit V

Artificial Intelligence and Machine Learning in Real World: Speech Processing, Natural Language Processing, Planning, manufacturing industry, logistic industry, retail industry. AI and DS in Healthcare, Defense and Agriculture, Cyber Security, Agriculture, E-Commerce, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.
- E. Alpaydin, Introduction to Machine Learning (3rd ed.), PHI, 2015. ISBN 978-8120350786.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence.

CO2. relate various computer components used in Artificial Intelligence.

CO3. identify different logical and reasoning techniques used in AI.

CO4. explain various supervised and unsupervised learning approaches.

CO5. compare various machine learning model.

CO6. solve the real world problems using the concepts of AI & ML.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XIV

Gaps in CO Attainment Levels for Session July - December 2021 & November 2021 – February 2022 Semester and Proposed Corrective Measures for Improvement (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics/ Artificial Intelligence & Data Science/ Artificial Intelligence & Machine Learning)

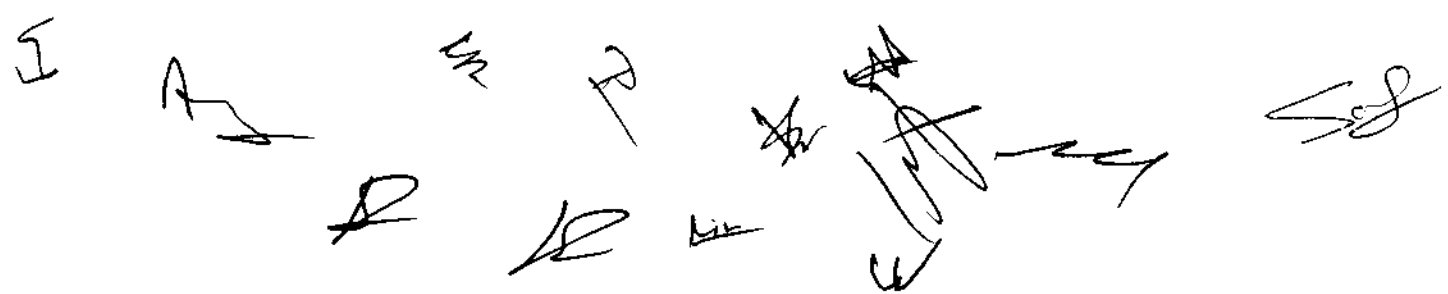
[ITEM IT-19]

Madhav Institute of Technology and Science, Gwalior
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Information Technology

Session: July-Dec. 2021

	Course Name		Course outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall Attainment level	Target of level	Gap	Action Taken
Semester I	100015: Energy Environment, Ecology & Society	CO1	describe various energy resources, their conversion to electrical power and role i	80.0	3.0	81.2	3.0	3.0	2.5	-0.5	Target is achieved and more higer order thinking and logical question should be included
		CO2	update with national/international power status and renewable power developm	76.8	3.0	81.2	3.0	3.0	2.5	-0.5	
		CO3	recognize the impact of pollution on the ecosystem and control policies adopted	76.8	3.0	84.1	3.0	3.0	2.5	-0.5	
		CO4	illustrate the concepts of ecosystems and their conservation.	77.6	3.0	85.5	3.0	3.0	2.5	-0.5	
		CO5	solve practical problems of society in a sustainable and ethical manner.	75.2	3.0	78.3	3.0	3.0	2.5	-0.5	
		CO6	fulfill professional duties keeping in mind the environmental safety, health, and w	76.8	3.0	85.5	3.0	3.0	2.5	-0.5	
	230102:Introduction to Computer Programming	CO1	Identify situations where computational methods and computers would be	75	3.0	81	3.0	3.0	2.2	-0.8	Satisfactorily attained. Problem formulation and solution of real life situations were discussed with students related to Programming for Problem Solving
		CO2	Describe the basic principles of imperative and structural programming.	76	3.0	79.71	3.0	3.0	2.2	-0.8	
		CO3	Develop a pseudo-code and flowchart for a given problem.	62	2.2	80	3.0	2.4	2.2	-0.2	
		CO4	Analyze the problems and choose suitable programming techniques to develop	72	3.0	78	3.0	3.0	2.2	-0.8	
		CO5	Design, implement, debug and test programs.	69.6	3.0	79.71	3.0	3.0	2.2	-0.8	
		CO6	Design computer programs to solve real world problems.	76.8	3.0	79.71	3.0	3.0	2.2	-0.8	
Semester III	160311:Computer System Organization	CO1	recall the basic building blocks of computer Architecture	60.8	2.1	77.33	3.0	2.3	2	-0.3	Target level is achieved. Increase the complexity of question during end term exam.
		CO2	compare different memories	64.8	2.5	76.00	3.0	2.6	2	-0.6	
		CO3	apply the concept of memory mapping, multiprocessor and pipelining in solving real world problems	61.2	2.1	76.00	3.0	2.3	2	-0.3	
		CO4	analyze various modes of Input-Output data transfer	60.80	2.1	72.00	3.0	2.3	2	-0.3	
		CO5	evaluate the arithmetic related to the number system	73.60	3.0	73.33	3.0	3.0	2	-1.0	
		CO6	develop the skill of writing low level programming.	61.20	2.1	74.66	3.0	2.3	2	-0.3	
	160312:Design & Analysis of Algorithms	CO1	Demonstrate a familiarity with major algorithms and data structures.	93.60	3.0	80.62	3.0	3.0	2	-1.0	Target of all CO is achieved. Practice questions will be provided from selected topics.
		CO2	Important algorithmic design paradigms and methods of analysis.	97.60	3.0	82.17	3.0	3.0	2	-1.0	
		CO3	Analyze the asymptotic performance of algorithms.	73.60	3.0	77.52	3.0	3.0	2	-1.0	
		CO4	Compare different design techniques to develop algorithms for computational problems.	62.40	2.2	79.07	3.0	2.4	2	-0.4	
		CO5	Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.	79.20	3.0	76.74	3.0	3.0	2	-1.0	
		CO6	Understand the hardness and different classes of hardness. Further, design approximate solutions for computationally hard problems.	92.80	3.0	75.19	3.0	3.0	2	-1.0	
	160313:Database Management System	CO1	demonstrate the concepts of different type of database system.	95.00	3.0	99.00	3.0	3.0	2.5	-0.5	Satsfactory achieved.Software training is to be provided for the students to understand the concept of DBMS
		CO2	apply relational algebra concepts to design database system.	98.00	3.0	88.00	3.0	3.0	2.5	-0.5	
		CO3	make use of queries to design and access database system.	94.00	3.0	96.00	3.0	3.0	2.5	-0.5	
		CO4	analyze the evaluation of transaction processing and concurrency control.	98.00	3.0	91.00	3.0	3.0	2.5	-0.5	
		CO5	determine the optimize database for real world applications.	93.00	3.0	93.00	3.0	3.0	2.5	-0.5	
		CO6	design a database system for a real world application.	98.00	3.0	100.00	3.0	3.0	2.5	-0.5	
	160314:Operating System	CO1	tell the basic concept of operating systems.	72.80	3.0	81.00	3.0	3.0	2	-1.0	All Cos are atttained. Target value must be increased
		CO2	explain the working procedure of the operating system.	63.20	2.3	75.00	3.0	2.5	2	-0.5	
		CO3	analyze the various operating system problems and issues.	68.00	2.8	83.00	3.0	2.8	2	-0.8	
		CO4	develop the solutions for various operating system problems and issues.	70.40	3.0	77.00	3.0	3.0	2	-1.0	
		CO5	measure the performance of various scheduling and allocation techniques.	70.40	3.0	73.00	3.0	3.0	2	-1.0	
		CO6	test the working of various scheduling and allocation techniques.	65.60	2.6	75.00	3.0	2.6	2	-0.6	

Semester V	160501:Discrete Structure	CO1	I am able to Understand the basic concept of set theory, prepositional logic,	72	3.0	83	3.0	3.0	2.5	-0.5	Doubt Clearing Classes are to be conducted for doubt clearing / revision of syllabus. All Cos are attained.
		CO2	I am able to Illustrate the knowledge of course content and distinguish between	69.6	3.0	61	2.1	2.8	2.5	-0.3	
		CO3	I am able to Implement the course content to solve the problems.	70	3.0	89	3.0	3.0	2.5	-0.5	
		CO4	I am able to Apply the concepts of studied topics with suitable technique faced	65.2	2.5	81	3.0	2.6	2.5	-0.1	
		CO5	I am able to Analyze the set theory, prepositional logic, graph theory, discrete	72.5	3.0	90	3.0	3.0	2.5	-0.5	
		CO6	I am able to Design analytical skill and interpret applications of engineering	74	3.0	88	3.0	3.0	2.5	-0.5	
	160502:Software Engineering	CO1	explain the various fundamental concepts of software engineering.	92.0	3.0	74.7	3.0	3.0	2.5	-0.5	Practical approaches will be followed in the theory classes so that more possibilities can be applied for learning purpose. Target level is achieved.
		CO2	develop the concepts related to software design & analysis.	81.6	3.0	69.3	2.9	3.0	2.5	-0.5	
		CO3	compare the techniques for software project management & cost estimation.	91.2	3.0	69.3	2.9	3.0	2.5	-0.5	
		CO4	choose the appropriate model for real life software project.	96.8	3.0	77.3	3.0	3.0	2.5	-0.5	
		CO5	design the software using modern tools and technologies.	99.2	3.0	68.0	2.8	3.0	2.5	-0.5	
		CO6	test the software through different approaches.	57.6	1.8	74.7	3.0	2.0	2.5	0.5	
	160503:Theory of Computation	CO1	I am able to explain the basic concepts of switching and finite automata theory	72.8	3.0	77.0	3.0	3.0	2	-1.0	CO4 is not achieved. Proper mapping is required in between CO and exam paper.
		CO2	I am able to relate practical problems to languages, automata, computability	78	3.0	73	3.0	3.0	2	-1.0	
		CO3	I am able to construct abstract models of computing and check their power to	78	3.0	79	3.0	3.0	2	-1.0	
		CO4	I am able to analyse the grammar, its types, simplification and normal form.	55	1.5	77	3.0	1.8	2	0.2	
		CO5	I am able to interpret rigorously formal mathematical methods to prove	75	3.0	75	3.0	3.0	2	-1.0	
		CO6	I am able to develop an overview of how automata theory, languages and	66	2.6	73	3.0	2.6	2	-0.6	
	160504:Microprocessor & Interfacing	CO1	Classify the concepts of different advanced microprocessors and	85.0	3.0	75	3.0	3.0	2.5	-0.5	All Cos are atttained. More Focus is require for solving problem related to micropocessor using experiments.
		CO2	Illustrate the various peripheral interfaces, controllers and bus standards.	84	3.0	75	3.0	3.0	2.5	-0.5	
		CO3	Build a system using peripheral devices and controllers for 8086 microprocessor.	96.0	3.0	70.0	3.0	3.0	2.5	-0.5	
		CO4	Distinguish the interface with various devices to the microprocessor.	88.0	3.0	72.0	3.0	3.0	2.5	-0.5	
		CO5	Design an interface for various devices on 8086/8051 based systems.	93	3.0	75.0	3.0	3.0	2.5	-0.5	
		CO6	Develops skills in assembly language programming for 8051 & 8086 applications.	92	3.0	70	3.0	3.0	2.5	-0.5	
Semester VII	160716: Mobile Computing	CO1	explain the basic concepts of mobile telecommunications system	97	3.0	75	3.0	3	2	-1	Improved questions to coverage more CO's
		CO2	demonstrate the infrastructure to develop mobile communications system	78.4	3.0	79	3.0	3	2	-1	
		CO3	classify the different generations and technology for mobile communications	99	3.0	66	2.6	2.92	2	-0.92	
		CO4	examine the working of different protocols of wireless mobile communicationtech	74	3.0	70	3.0	3	2	-1	
		CO5	determine the importance of each technology suitable for different situation of mo	67	2.7	75	3.0	2.76	2	-0.76	
		CO6	develop protocols for adhoc and infrastructure based wireless networks.	86	3.0	79	3.0	3	2	-1	
	900208: Soft Computing	CO1	define basic concepts of neural network and fuzzy systems	90	3.0	72	3.0	3	2	-1	Systematic procedure is adopted for CO- PO mapping and attainment level. Target is achieved.
		CO2	compare solutions by applying various soft computing approaches on a given pr	83.0	3.0	65	2.5	2.9066	2	-0.9066	
		CO3	develop and train different supervised and unsupervised learning	91	3.0	65	2.5	2.9066	2	-0.9066	
		CO4	classify various nature inspired algorithms according to their application aspect.	93.5	3.0	76	3.0	3	2	-1	
		CO5	compare the efficiency of various hybrid systems.	94.5	3.0	61	2.1	2.8266	2	-0.8266	
		CO6	design a soft computing model for solving real world problems	60	2.0	71	3.0	2.176	2	-0.176	
	900209: Network Security	CO1	define various aspects of network security	84.8	3.0	73	3.0	3	2	-1	Students are motivated to do industry oriented projects by considering real time problems.
		CO2	illustrate fundamentals of number theory and cryptography	80.0	3.0	74	3.0	3	2	-1	
		CO3	apply security mechanisms to achieve principles of network security	82.4	3.0	73	3.0	3	2	-1	
		CO4	analyze the cause for various existing network attacks	90	3.0	73	3.0	3	2	-1	
		CO5	examine the vulnerabilities in applications over internet.	86.4	3.0	72	3.0	3	2	-1	
		CO6	develop a secure protocol for achieving various network security services.	72.8	3.0	73	3.0	3	2	-1	
	900220: R Programming	CO1	define basic programming constructs used in R.	80.6	3.0	75	3.0	3	2	-1	Real life programming type question can be included. Target levels are achieved
		CO2	explain the various commands used in R.	80.8	3.0	83.3	3.0	3	2	-1	
		CO3	apply various concept of programming for controlling the flow of data using	70.4	3.0	77.8	3.0	3	2	-1	
		CO4	analyze the concept of concept of object oriented programming in R.	68.0	2.8	77.8	3.0	2.84	2	-0.84	
		CO5	choose appropriate packages of R programming for dealing various tasks.	94.4	3.0	77.8	3.0	3	2	-1	
		CO6	predict results from the datasets using R commands.	78.4	3.0	77.8	3.0	3	2	-1	
	900222: Computer Networks	CO1	I am able to explain the fundamental concepts of computer network.	96	3.0	76.0	3.0	3	2.5	-0.5	Simulation and analysis of existing computer network is required. All Cos are achieved.
		CO2	I am able to illustrate the basic taxonomy & terminologies of computer network.	95.2	3.0	74.7	3.0	3	2.5	-0.5	
		CO3	I am able to identify various parameter for affecting the performance of computer	95.2	3.0	76.0	3.0	3	2.5	-0.5	
		CO4	I am able analyze the concepts of communication using various layer of OSI mod	91.2	3.0	73.3	3.0	3	2.5	-0.5	
		CO5	I am able to evaluate the performance of computer network in congestion and Int	92.8	3.0	74.7	3.0	3	2.5	-0.5	
		CO6	I am able to design the network environment and applications for implementation	95.2	3.0	74.7	3.0	3	2.5	-0.5	



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Department of Information Technology

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	Course Name		Course outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall Attainment %	Overall level of Attainment	Target of level	Gap	Action Taken
Semester I	(100015)Energy Environment, Ecology & Society	CO1	Describe various energy resources, their conversion to ele	76.8	3.0	79.2	3.0	77.3	3.00	2.5	-0.50	All Cos are attained. More Focus is require for solving problem related to micropocessor using expenments.
		CO2	Update with national/international power status and renew	75.4	3.0	77.6	3.0	75.8	3.00	2.5	-0.50	
		CO3	Recognize the impact of pollution on the ecosystem and c	76.8	3.0	83.2	3.0	78.1	3.00	2.5	-0.50	
		CO4	Illustrate the concepts of ecosystems and their conservati	79.7	3.0	54.4	1.4	74.6	2.69	2.5	-0.19	
		CO5	Solve practical problems of society in a sustainable and et	76.8	3.0	81.6	3.0	77.8	3.00	2.5	-0.50	
		CO6	Fulfill professional duties keeping in mind the environmen	81.2	3.0	60.0	2.0	76.9	2.80	2.5	-0.30	
	(240101)Introduction to Artificial Intelligence	CO1	define basic concepts of Artificial Intelligence	98	3.0	93	3.0	96.6	3.00	2.4	-0.60	Systematic procedure is adopted for CO- PO mapping and attainment level. Target is achieved.
		CO2	relate various computer components used in Artificial Intel	96	3.0	94.2	3.0	95.6	3.00	2.4	-0.60	
		CO3	identify different logical and reasoning techniques used in	89	3.0	96	3.0	90.2	3.00	2.4	-0.60	
		CO4	analyze the general approach of optimization, intelligent a	100	3.0	91	3.0	98.3	3.00	2.4	-0.60	
		CO5	analyze the general approach of machine learning	90.4	3.0	92.75	3.0	90.9	3.00	2.4	-0.60	
		CO6	build AI enabled intelligent procedures for solving real wor	92.8	3.0	88.4	3.0	91.9	3.00	2.4	-0.60	
	240102 Introduction to Computer Programming	CO1	identify situations where computational methods and com	78.4	3.0	85.5	3.0	79.8	3.00	2.5	-0.50	Practical approaches will be followed in the theory classes so that more possibilities can be applied for learning purpose. Target level is achieved.
		CO2	describe the basic principles of imperative and structural p	80	3.0	85.5	3.0	81.1	3.00	2.5	-0.50	
		CO3	develop a pseudo-code and flowchart for a given problem.	78.4	3.0	79.71	3.0	78.7	3.00	2.5	-0.50	
		CO4	analyze the problems and choose suitable programming t	70.4	3.0	88.4	3.0	74.0	3.00	2.5	-0.50	
		CO5	design, implement, debug and test programs.	77.6	3.0	81.15	3.0	78.3	3.00	2.5	-0.50	
		CO6	design computer programs to solve real world problems.	80	3.0	81.15	3.0	80.2	3.00	2.5	-0.50	
Semester III	240301 Design & Analysis of Algorithms	CO1	I am able to demonstrate a familiarity with major algorithm	94.40	3.0	75.93	3.0	90.71	3.00	2.5	-0.50	Can be included higer order thinking and logical question
		CO2	I am able to apply important algorithmic design paradigms	80.80	3.0	72.22	3.0	79.08	3.00	2.5	-0.50	
		CO3	I am able to analyze the asymptotic performance of algorit	91.20	3.0	75.93	3.0	88.15	3.00	2.5	-0.50	
		CO4	I am able to compare different design techniques to devel	96.80	3.0	70.37	3.0	91.51	3.00	2.5	-0.50	
		CO5	I am able to design algorithms using greedy strategy, divid	92.00	3.0	77.78	3.0	89.16	3.00	2.5	-0.50	
		CO6	I am able to understand the hardness and different classes	96.00	3.0	74.07	3.0	91.61	3.00	2.5	-0.50	
	240302 Operating System	CO1	tell the basic concept of operating systems.	78.40	3.0	83.00	3.0	79.32	3.00	2.5	-0.50	More higer order thinking and logical question should be included
		CO2	explain the working procedure of the operating system.	73.60	3.0	81.00	3.0	75.08	3.00	2.5	-0.50	
		CO3	analyze the various operating system problems and issue	78.40	3.0	83.00	3.0	79.32	3.00	2.5	-0.50	
		CO4	develop the solutions for various operating system proble	85.60	3.0	77.00	3.0	83.88	3.00	2.5	-0.50	
		CO5	measure the performance of various scheduling and alloc	80.00	3.0	75.00	3.0	79.00	3.00	2.5	-0.50	
		CO6	test the working of various scheduling and allocation techr	80.00	3.0	81.00	3.0	80.20	3.00	2.5	-0.50	
	240303 (AIR)Computer Networks and Protocols	CO1	I am able to explain the fundamental concepts of compute	80.00	3.0	74.00	3.0	78.80	3.00	2.5	-0.50	Target level is achieved. Increase the complexity of question during end term exam.
		CO2	I am able to illustrate the basic taxonomy & terminologies	80.00	3.0	69.00	2.9	77.80	2.98	2.5	-0.48	
		CO3	I am able to develop a concept for understanding advance	78.00	3.0	69.00	2.9	76.20	2.98	2.5	-0.48	
		CO4	I am able to build the skill of IP addressing and routing me	63.00	2.3	69.00	2.9	64.20	2.42	2.5	0.08	
		CO5	I am able to predict the performance of computer network	68.00	2.8	72.00	3.0	68.80	2.84	2.5	-0.34	
		CO6	I am able to construct the network environment for implem	78.00	3.0	70.00	3.0	76.40	3.00	2.5	-0.50	
	240304 (AIR)Database Management System	CO1	demonstrate the concepts of different type of database system	78.40	3.0	56.19	1.6	73.96	2.72	2.5	-0.22	Simulation and analysis of existing computer network is required. All Cos are achieved.
		CO2	apply relational algebra concepts to design database system	80.00	3.0	51.43	1.1	75.2	2.63	2.5	-0.13	
		CO3	make use of queries to design and access database system.	85.60	3.0	51.43	1.1	78.8	2.63	2.5	-0.13	
		CO4	analyze the evaluation of transaction processing and concurrenc	62.40	2.2	51.43	1.1	60.2	2.02	2.5	0.48	
		CO5	determine the optimize database for real world applications.	75.20	3.0	55.24	1.5	70.4	2.70	2.5	-0.20	
		CO6	design a database system for a real world application	80.00	3.0	50.48	1.0	74.1	2.61	2.5	-0.11	

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	Course Name		Course outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall level of Attainment	Target of level	Gap	Action Taken
Semester I	100015: Energy Environment, Ecology & Society	CO1	Describe various energy resources, their conversion to electrical power and role in technological & economic development.	91.3	3.0	79.2	3.0	3.00	2.5	-0.50	Target level is achived and we will increase higer order thinking and logical question in end sem examination.
		CO2	Update with national/international power status and renewable power development targets & missions.	85.5	3.0	84.8	3.0	3.00	2.5	-0.50	
		CO3	Recognize the impact of pollution on the ecosystem and control policies adopted at national/international levels.	91.3	3.0	88.0	3.0	3.00	2.5	-0.50	
		CO4	Illustrate the concepts of ecosystems and their conservation.	85.5	3.0	66.4	2.6	2.93	2.5	-0.43	
		CO5	Solve practical problems of society in a sustainable and ethical manner.	85.5	3.0	81.6	3.0	3.00	2.5	-0.50	
		CO6	Fulfill professional duties keeping in mind the environmental safety, health, and welfare of public.	85.5	3.0	60.0	2.0	2.80	2.5	-0.30	
	270101: Introduction to Artificial Intelligence & Data Science	CO1	I am able to explain the concept with examples.	94	3.0	78	3.0	3.00	2.5	-0.50	Target is achived. In future, more higer order thinking and logical question should be included.
		CO2	I am able to analyze the AI evolution.	87.2	3.0	81.15	3.0	3.00	2.5	-0.50	
		CO3	I am able to understand Machine learning processes.	86	3.0	78	3.0	3.00	2.5	-0.50	
		CO4	I am able to explain steps involved in Data science.	84	3.0	75	3.0	3.00	2.5	-0.50	
		CO5	I am able to describe fundamental components of AI in DS.	92	3.0	79.71	3.0	3.00	2.5	-0.50	
		CO6	I am able to understand the various industrial applications of AI.	89.6	3.0	84.05	3.0	3.00	2.5	-0.50	
	270102: Introduction to Computer Programming	CO1	Identify situations where computational methods and computers would be useful.	76.00	3.0	81.15	3.0	3.00	2.00	-1.00	As per analysis, target of all CO's are achived in subject. Furthermore, some higer order thinking and logical questions can be included.
		CO2	Describe the basic principles of imperative and structural programming.	76.00	3.0	84.05	3.0	3.00	2.00	-1.00	
		CO3	Develop a pseudo-code and flowchart for a given problem.	63.20	2.3	85.50	3.0	2.46	2.00	-0.46	
		CO4	Analyze the problems and choose suitable programming techniques to develop solutions.	62.40	2.2	81.15	3.0	2.39	2.00	-0.39	
		CO5	Design, implement, debug and test programs.	69.60	3.0	79.71	3.0	2.97	2.00	-0.97	
		CO6	Design computer programs to solve real world problems.	75.20	3.0	76.81	3.0	3.00	2.00	-1.00	

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	Course Name		Course outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall level of Attainment	Target of level	Gap	Action Taken
Semester I	100015: Energy Environment, Ecology & Society	CO1	Describe various energy resources, their conversion to electrical power and role in technological & economic development.	82.6	3.0	78.4	3.0	3.00	2.5	-0.50	Target level is achived and we will increase higer order thinking and logical question in end sem examination.
		CO2	Update with national/international power status and renewable power development targets & missions	78.3	3.0	81.6	3.0	3.00	2.5	-0.50	
		CO3	Recognize the impact of pollution on the ecosystem and control policies adopted at national/international levels.	76.8	3.0	90.4	3.0	3.00	2.5	-0.50	
		CO4	Illustrate the concepts of ecosystems and their conservation	85.5	3.0	66.4	3.0	3.00	2.5	-0.50	
		CO5	Solve practical problems of society in a sustainable and ethical manner	76.8	3.0	80.0	3.0	3.00	2.5	-0.50	
		CO6	Fulfill professional duties keeping in mind the environmental safety, health, and welfare of public	84.1	3.0	57.6	3.0	3.00	2.5	-0.50	
	280101: Introduction to Artificial Intelligence & Machine Learning	CO1	Define basic concepts of Artificial Intelligence	90	3.0	78	3.0	3.00	3	0.00	Target is achived. In future, more higer order thinking and logical question should be included.
		CO2	To relate various computer components used in Artificial Intelligence	94.4	3.0	76.81	3.0	3.00	3	0.00	
		CO3	To familiarize and learn about the latest trends and research in the field	98	3.0	80	3.0	3.00	3	0.00	
		CO4	to understand the real world problems and applications of AI and ML for solving the problems	88	3.0	77	3.0	3.00	3	0.00	
		CO5	to build AI enabled intelligent procedures for solving real world problems	93.6	3.0	86.95	3.0	3.00	3	0.00	
		CO6	to build AI enabled intelligent procedures for solving real world problems	94.4	3.0	85.5	3.0	3.00	3	0.00	
	280102: Introduction to Computer Programming	CO1	identify situations where computational methods and computers would be useful.	75.20	3.0	71.01	3.0	3.00	2.00	-1.00	As per analysis, target of all CO's are achived in subject. Furthermore, some higer order thinking and logical questions can be included.
		CO2	describe the basic principles of imperative and structural programming.	75.20	3.0	71.01	3.0	3.00	2.00	-1.00	
		CO3	develop a pseudo-code and flowchart for a given problem.	75.20	3.0	72.46	3.0	3.00	2.00	-1.00	
		CO4	analyze the problems and choose suitable programming techniques to develop solutions.	75.20	3.0	72.46	3.0	3.00	2.00	-1.00	
		CO5	design, implement, debug and test programs.	70.40	3.0	75.36	3.0	3.00	2.00	-1.00	
		CO6	design computer programs to solve real world problems.	76.80	3.0	69.56	3.0	3.00	2.00	-1.00	

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	Course Name		Course outcomes	Direct Attainment %	Level of Direct Attainment	Indirect Attainment %	Level of Indirect Attainment	Overall level of Attainment	Target of level	Gap	Action Taken
Semester I	230101 (IoT) Introduction to Internet of Things (IoT)	CO1	Explain basic terminology of Internet of Things.	76.8	3.0	85.5	3.0	3.00	2.2	-0.80	Can be included heger order thinking and logical question
		CO2	Illustrate the role of communication in IoT.	79.2	3.0	87.0	3.0	3.00	2.2	-0.80	
		CO3	Identify and use various protocols devices that are used in IoT.	74.4	3.0	82.6	3.0	3.00	2.2	-0.80	
		CO4	Classify networking, cloud and fog computing concept for data management	76.8	3.0	82.6	3.0	3.00	2.2	-0.80	
		CO5	Investigate challenges, security and privacy.	76.8	3.0	81.2	3.0	3.00	2.2	-0.80	
		CO6	Discuss different IoT enabled techniques behind interaction between things	80.0	3.0	75.7	3.0	3.00	2.2	-0.80	
	EEE8(100915)	CO1	Describe various energy resources, their conversion to electrical power and role in technological & economic	87	3.0	79	3.0	3.00	2.5	-0.50	More heger order thinking and logical question should be included
		CO2	Update with national/international power status and renewable power development targets & missions	83	3.0	90	3.0	3.00	2.5	-0.50	
		CO3	Recognize the impact of pollution on the ecosystem and control policies adopted at national/international level	83	3.0	88	3.0	3.00	2.5	-0.50	
		CO4	Illustrate the concepts of ecosystems and their conservation	84	3.0	66	2.6	2.93	2.5	-0.43	
		CO5	Solve practical problems of society in a sustainable and ethical manner	81	3.0	82	3.0	3.00	2.5	-0.50	
		CO6	Fulfill professional duties keeping in mind the environmental safety, health, and welfare of public	86	3.0	58	1.8	2.75	2.5	-0.25	
	230102:Introduction to Computer Programming	CO1	identify situations where computational methods and computers would be useful	80	3.0	83	3.0	3.00	2.5	-0.50	Practical approaches will be followed in the theory classes so that more possibilities can be applied for learning purpose. Target levels achieved.
		CO2	describe the basic principles of imperative and structural programming.	80	3.0	81.15	3.0	3.00	2.5	-0.50	
		CO3	develop a pseudo-code and flowchart for a given problem.	70	3.0	80	3.0	3.00	2.5	-0.50	
		CO4	analyze the problems and choose suitable programming techniques to develop solutions	65	2.5	78	3.0	2.58	2.5	-0.08	
		CO5	design, implement, debug and test programs	79.2	3.0	73.91	3.0	3.00	2.5	-0.50	
		CO6	design computer programs to solve real world problems.	80	3.0	79.71	3.0	3.00	2.5	-0.50	
Semester III	230301 (IoT)Design & Analysis of Algorithms	CO1	demonstrate a familiarity with major algorithms and data structures	94.40	3.0	78.29	3.0	3.00	2.2	-0.80	Target level is achieved. Increase the complexity of question during end term exam.
		CO2	apply important algorithmic design paradigms and methods of analysis	83.20	3.0	80.30	3.0	3.00	2.2	-0.80	
		CO3	analyze the asymptotic performance of algorithms.	86.40	3.0	84.85	3.0	3.00	2.2	-0.80	
		CO4	compare different design techniques to develop algorithms for computational problems.	96.80	3.0	80.30	3.0	3.00	2.2	-0.80	
		CO5	and branch n bound approach.	80.00	3.0	75.76	3.0	3.00	2.2	-0.80	
		CO6	computationally hard problems.	94.40	3.0	80.30	3.0	3.00	2.2	-0.80	
	230302 (IoT)Operating System	CO1	The basic concept of operating systems	90.40	3.0	82.05	3.0	3.00	2.5	-0.50	All Cos are attained. More Focus is require for solving problem related to microprocessor using experiments
		CO2	Explain the working procedure of the operating system	90.40	3.0	82.05	3.0	3.00	2.5	-0.50	
		CO3	Analyze the various operating system problems and issues.	67.20	2.7	74.35	3.0	2.78	2.5	-0.28	
		CO4	Develop the solutions for various operating system problems and issues	88.00	3.0	79.48	3.0	3.00	2.5	-0.50	
		CO5	measure the performance of various scheduling and allocation techniques	84.00	3.0	79.48	3.0	3.00	2.5	-0.50	
		CO6	test the working of various scheduling and allocation techniques.	83.20	3.0	71.79	3.0	3.00	2.5	-0.50	
	230303 (IoT) Computer Networks and Protocols	CO1	explain the fundamental concepts of computer network	73.00	3.0	83.00	3.0	3.00	2.2	-0.80	Systematic procedure is adopted for CO- PO mapping and attainment level. Target is achieved
		CO2	illustrate the basic taxonomy & terminologies of computer network protocols	75.00	3.0	76.00	3.0	3.00	2.2	-0.80	
		CO3	develop a concept for understanding advance computer network	70.00	3.0	76.00	3.0	3.00	2.2	-0.80	
		CO4	build the skill of IP addressing and routing mechanism	65.00	2.3	80.00	3.0	2.44	2.2	-0.24	
		CO5	predict the performance of computer network in congestion and internet.	66.00	2.6	72.00	3.0	2.68	2.2	-0.48	
		CO6	construct the network environment for implementation of computer networking concept	78.00	3.0	80.00	3.0	3.00	2.2	-0.80	
	230304 (IoT) Database Management System	CO1	demonstrate the concepts of different type of database system	78.40	3.0	56.2	1.6	2.72	2.5	-0.22	Simulation and analysis of existing computer network is required. All Cos are achieved
		CO2	apply relational algebra concepts to design database system	80.00	3.0	51.4	1.1	2.63	2.5	-0.13	
		CO3	make use of queries to design and access database system	85.40	3.0	51.4	1.1	2.63	2.5	-0.13	
		CO4	analyze the evaluation of transaction processing and concurrency control	62.40	2.2	51.4	1.1	2.02	2.5	-0.48	
		CO5	determine the optimize database for real world applications	75.20	3.0	55.2	1.5	2.70	2.5	-0.20	
		CO6	design a database system for a real world application	80.00	3.0	50.5	1.9	2.61	2.5	-0.11	

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XV

PO Attainment, CO-PO Mapping and Gap Analysis for Batch 2017-2021 (Information Technology)

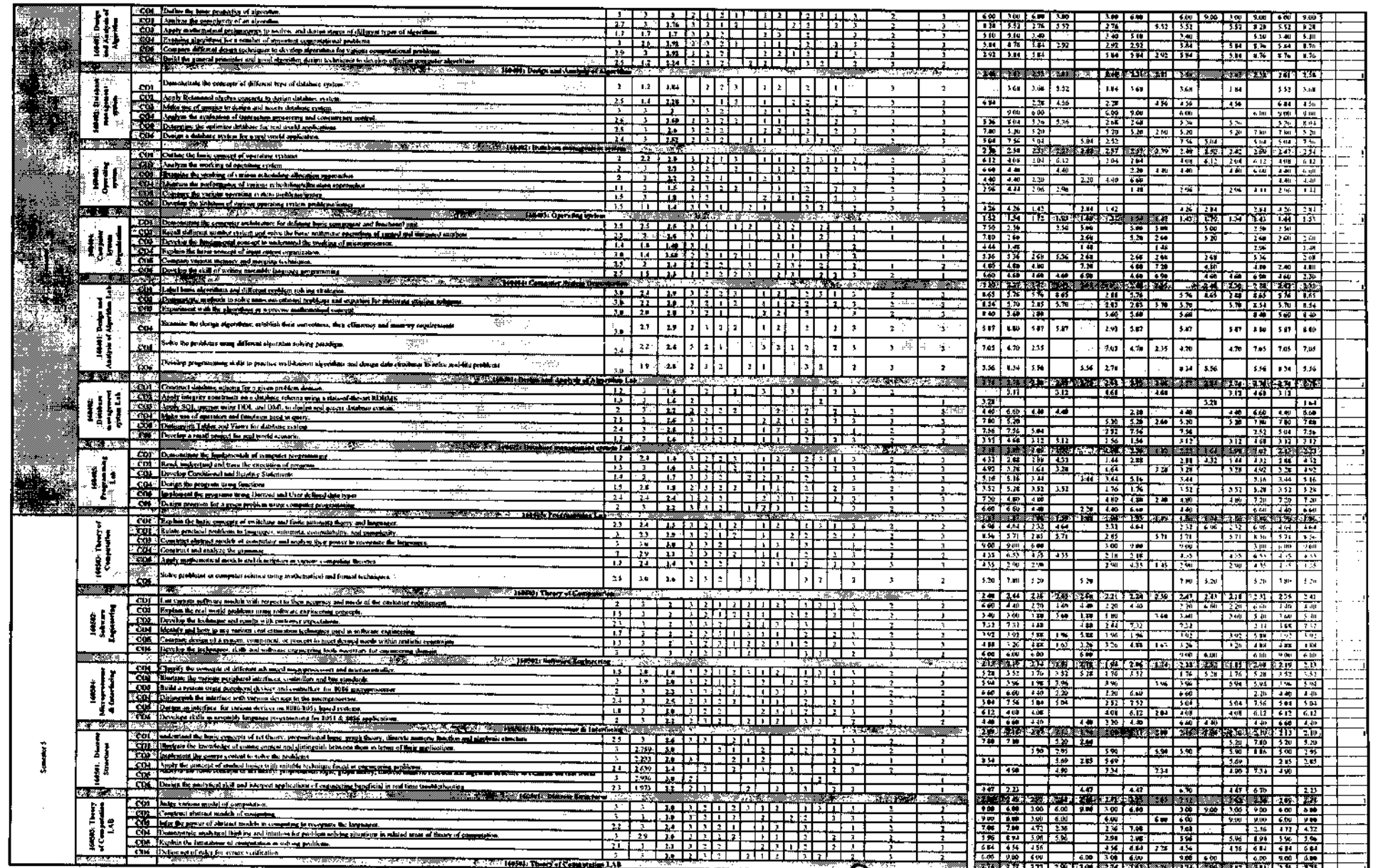
[ITEM IT-20]

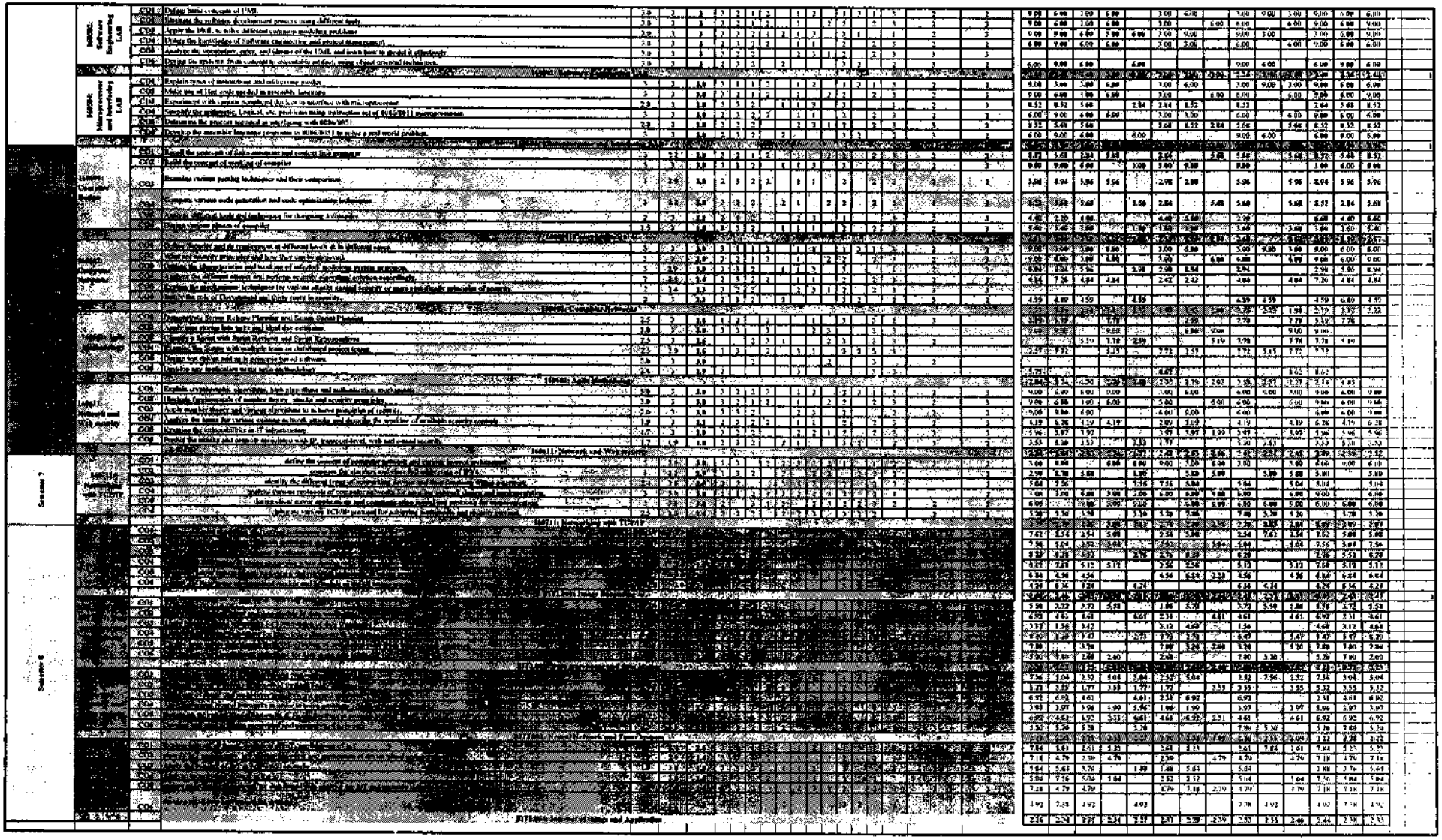
Madhav Institute of Technology & Science, Gwalior- 474 005

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

Department : Information Technology

Year	2017-2021			CO Attainment			CO-PO Matrix													PO Attainment										
			Course Outcome	Direct Attainment	Indirect Attainment	Total Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2										
Semester 3		CO1	Illustrate various number systems, Binary codes and its application in digital design.	2.5	3	2.5	3	3			2	3					3	3	3	2	7.00	9.00			5.00	2.00			5.00	9.00	5.00	5.00
		CO2	Identify the logic functions, example, truth tables and also apply the laws of Boolean algebra to simplify circuits and expressions.	2.5	3	2.5			2	1	2			3	2		3	3	3	2			5.00		5.00	2.50			5.00	7.50	5.00	2.50
		CO3	Develop the formal procedures for the analysis and design of combinational circuits.	2.5	1.5	2.5	3			2	3	2				2			3	2	7.14				4.76	2.38			4.76		2.38	2.38
		CO4	Analyze sequential circuit's components and their usability in digital circuits.	2.5	1.5	2.5		2		3		3			3	2	2		2			5.26			2.63			5.26		5.26	2.63
		CO5	Compare the concept of memories, programmable devices and digital ICs.	2.5	2.5	2.5	2								2				2		5.00				5.00						2.50
		CO6	Design and analyze circuits for digital arithmetic.	2.5	1.5	2.5	2	1			2	2		3		2	2			1	6.67	3.33			6.67				6.67	6.67		3.33
		CO1	Outline the basics of algorithms and their performance criteria.	2.7	3	2.8	3	2	2	3		3	2		2		3		2		8.33	9.00	5.33	9.00		5.33		2.76		5.52	
		CO2	Explain the working of linear and non-linear data structures	2.7	3	2.8	3	2	1	2		3	2	3		2			2		8.33	9.00	2.76	5.52		5.52		2.76		5.52	
		CO3	Identify the appropriate data structure to solve the specific problem.	2.7	1.5	2.6	3	3	2			3	2		2			2	3		6.00	6.00	4.00			4.00		4.00	4.00		
		CO4	Analyze the performance of various data structures and their applications.	2.5	3	2.6	3	3	2	3			2		2				2		4.80	7.20	4.80	4.80		2.40	2.40		4.80		4.80	7.20
		CO5	Evaluate the time and space complexities of various data structures and their applications.	2.5	3	2.6	3	3	2			3	2	3	2		2		3		5.33	6.00	5.33		2.66	5.66		5.66		5.66	8.33		8.33
		CO6	Design the optimal algorithmic solutions for various problems.	2.5	2.5	2.5	3	3	2		2	3			2	2	2		3		4.92	7.38	4.92			4.92	7.38		4.92	7.38		4.92
		CO1	Relate the concepts and significance of OOPS in real world.	3	3	3.0	1	2		3			1		3		3	3	3		9.00	6.00			9.00			9.00	9.00	9.00	
		CO2	Demonstrate adequate of object oriented programming to solve problems using Object oriented concepts.	3	3	3.0	3	3		3			3	3			3	3			9.00	9.00			9.00			9.00	9.00		
		CO3	Apply object oriented programming to develop solutions of problems using standard language constructs.	1.8	3	2.0			2	3	3			3	3		3	3					6.00			6.12	6.12	6.12	6.12	6.12	6.12
		CO4	Analyze data flow diagrams and flow charts for small/ medium problems.	3	3	3.0	3	3		2		3	3	3		3					9.00	9.00			9.00		9.00	9.00	9.00	9.00		
		CO5	Determine how to translate the problems in field of Operating system, Computer networks and real world problems.	1.9	3	2.8			2				2			3		2							4.74			6.56		4.74		
		CO6	Develop software using concepts of object oriented classes and interface constructs.	2	2	2.3	2				3					3	3				6.00				6.00			6.00	6.00		
		CO1	Illustrate the fundamental concepts of Computer Graphics, hardware & software components and its applications.	1.9	2.9	2.9	3	3	2	3		3	3	2	3	3	3	3	2		2.92	8.04			4.03	6.06	2.02	6.06	4.04	6.06	
		CO2	Develop various graphical image operations & manipulations on multiple and algorithms.	1.9	3	2.9	3	3	3	3		3	3	3	3	3	3	3	2		2.04		4.08	4.08		4.08	6.12	4.08	6.12		
		CO3	Apply various methods of conversion & manipulation of images for creating meaningful images and color models.	1.9	2.6	2.8	3	3	2			2	2			3		3	2		4.08	8.12			4.08			4.08	4.08	8.12	
		CO4	Explain various animation, illumination and color models of realistic image or phenomena using image generation techniques.	2.6	3	2.7	3	3	2	2		3	3			3		3	2		5.26	7.89			5.26			5.26	8.04	7.89	
		CO5	Discuss various methods to create natural scene & realistic images in 2D & 3D image.	1.9	3	2.7	3	3	2		3	3	3			3		3	2		2.88	2.88			5.26			5.26	8.04	5.26	8.04	
		CO6	Design & analysis of various graphical image processing techniques and animation.	1.9	3	2.7	3	3	2			3	3			3		3	2													
		CO1	Outline the basics of algorithms and their performance criteria.	2.5	3	2.7	3	3	2	3			2	3	3	2	3		2		3.38	4.50	3.38		4.92	3.28		3.28	4.92	3.28	
		CO2	Explain the working of linear and non-linear data structures.	2.8	3	3	3	3	3	3		3	3	3	3	3	3		2		3.00	6.00	3.00	6.00		6.00		6.00	9.00	6.00	9.00	
		CO3	Identify the appropriate data structure to solve the specific problem.	2.9	2.9	3	3	3	2			2	3		2		2		2		8.70	8.70	5.84			5.84	8.76		5.84	5.84	8.76	
		CO4	Analyze the performance of various data structures and their applications.	2.6	3	3	3	3	2	3		3	3		3	2	2		2		7.04	7.56	7.04	5.84		5.84		5.84	7.56	5.84	7.56	
		CO5	Evaluate the time and space complexities of various data structures and their applications.	2.9	2.6	3	3	3	3		3	3	3		3	2	3		3		8.78	5.84	5.84		2.92	5.84		5.84	8.76	8.76	8.76	
		CO6	Design the optimal algorithmic solutions for various problems.	2.7	2.8	3	3	3	3	3	3	3	3		3	2	3		3		5.84	8.16	5.44			5.44	8.16		5.44	8.16	5.44	
		CO1	Demonstrate the fundamental concepts of Computer Graphics and its applications.	2.5	2.4	2.5	3	2	1	2		3	2		1	3	1	2		2	5.44	4.96	2.48	4.96		2.48	7.44	2.48	7.44	4.96	4.96	
		CO2	Explain pipeline hardware and software components of computer graphics.	3	2.9	2.9	3	3	3	3		3	3		2	3			2		8.94	5.96	2.98		5.96	5.96		5.96	8.94	5.96	8.94	
		CO3	Apply various image generation, manipulations and color model techniques in coding.	2.6	3	2.7	3	3	2	3	2	3		3		3		3	2		8.04	8.04	5.36	2.68	5.36	8.04	2.68		2.68	5.36	8.04	
		CO4	Implement algorithms for circle and ellipse plot, also in cryptography.	2.9	3	2.9	3	3	3	3		3	3		3	3		3	2		5.52	8.28	5.52		2.76	2.76		5.52	8.28	5.52	5.52	
		CO5	Describe the ability to work creatively in groups for create visual and animation using graphics concepts.	3	3	3.0	3	3	3	3	3	3	3		3	3		3	2		8.00	6.00		2.00	6.00	8.00	2.00		6.00	8.00	6.00	8.00
		CO6	Develop application programs and projects in range of image and animation using computer graphics.	3	3	3.0	3	3	3	3	3	3	3		3	3		3	2		8.00	8.00	8.00	2.00	8.00	8.00	2.00		8.00	8.00	8.00	8.00
		CO1	Select proper arithmetic, logical, relational, and string manipulation expressions to process data.	3	2.8	2.9	3	3	2	3		3	2		3	3	3	3	3		5.70	5.70	5.70	2.28	5.70	5.70	2.28	5.70	5.70	5.70	5.70	
		CO2	Demonstrate the use of various OOPS concepts with the help of programs.	3	3	3	3	3	3	3	3	3	3		3	3	3	3	3		6.00	6.00	6.00			6.00		6.00	6.00	6.00	6.00	
		CO3	Apply inheritance techniques to build a suitable solution to a given problem.	2.4	3	2.8	2	3	2	3		3	3		3	3	3	3	3		5.04	7.56	5.04			5.04			5.04	7.56	7.56	
		CO4	Analyze and write programs to solve more complicated problems using the concepts of Object Oriented Methodology.	3	3	3	3	3	3	3	3	3	3		3	3	3	3	3		6.00	6.00	6.00			6.00		6.00	6.00	6.00	6.00	
		CO5	Choose appropriate programming constructs or and when required in the larger application development.	3	3	3	3	3	3	3	3	3	3		3	3	3	3	3		9.00	9.00	9.00	3.00	9.00	9.00	3.00		9.00	9.00	9.00	9.00
		CO6	Construct a complete class definition with its class definition, write class and inclusion methods including the constructor and overloaded methods.	2.4	3.1	2.84	3	3	3	3	3	3	3		3	3	3	3	3		6.00	7.00	5.34	2.00	6.00	7.00	4.00		6.00	7.02	7.02	2.34
		CO1	Explain basics of different complexity parameters and structures.	2.7	1.8	2.7	3	3	3	3	3	3	3	3	3	3	3	3	3		6.00	6.00	3.78	3.78	3.78	6.00	3.78		6.00	6.00	6.00	6.00
		CO2	Demonstrate an awareness of various geometry problems domain and their functioning.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		9.00	9.00	6.00	6.00	6.00	9.00	6.00		9.00	9.00	9.00	9.00
		CO3	Demonstrate the designs of system buses, memory systems, and I/O interfaces.	2	3	2.3	2	3	3	3	3	3	3	3	3	3	3	3	3		6.00	9.00	3.78	3.78	3.78	7.56	3.78		7.56	9.00	9.00	9.00
		CO4	Identify the pipeline configuration of the computers peripherals and structural topology approach through the current point.	3.2	2.9	3.08	3	3	2	3	3	3	3	3	3	3	3	3	3		6.08	8.04	5.04	4.04		4.04	8.08	2.02	8.08	6.06	6.06	
		CO5	Analyze programs in contemporary multimodule and bus systems.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3													
		CO6	Construct a multimodule based on PCI architecture.	2.4	3	2.64	3	3	3	3	3	3	3	3	3	3	3	3	3		7.56	7.56	5.04			2.52			7.56	5.04	7.56	





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Department : Information Technology Year 2017-2021

S.No.	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
1	160301: Digital Electronics	2.40	2.55	2.52	2.53	2.38	2.52	2.26	2.58	2.36	2.42	2.48	2.50	2.55	2.46
2	160302: Data Structures	2.54	2.47	2.50	2.66	2.36	2.50	2.45	2.79	2.51	2.36	2.68	2.46	2.45	2.56
3	160304: OOPs and methodology	2.77	3.00	2.08	2.74	2.04	2.60	3.00	2.47	2.68	3.00	2.56	2.62	2.47	
4	160303: Computer Graphics and Multimedia	1.68	1.81	1.71	2.21	1.64	1.56	1.61	1.36	1.73	1.87	1.64	1.72	1.61	1.74
5	160302: Data Structure LAB	2.80	2.77	2.76	2.69	2.72	2.82	2.79	2.97	2.78	2.65	2.78	2.78	2.79	2.78
6	160303: Computer Graphics LAB	2.81	2.82	2.83	2.73	2.84	2.82	2.75	2.99	2.85	2.69	2.85	2.82	2.84	2.83
7	160304: Object Oriented Programming LAB	2.84	2.76	2.83	2.76	3.00	2.81	2.80	3.00	2.78	2.68	2.99	2.81	2.76	2.84
8	160305: Hardware LAB	1.96	1.82	2.02	2.07	0.77	2.28	2.49	1.50	1.98	2.09	1.80	1.98	2.25	2.11
9	160402: Database management system	2.50	2.58	2.51	2.21	2.52	2.57	2.57	2.39	2.49	2.52	2.42	2.69	2.47	2.54
10	160403: Operating system	1.52	1.54	1.72	1.93	1.68	1.31	1.54	1.47	1.43	1.79	1.34	1.43	1.44	1.53
11	160404: Computer System Organization	2.30	2.37	2.42	2.49	2.35		2.48	2.35		2.48	2.30	2.28	2.42	2.31
12	160401: Design and Analysis of Algorithm Lab	2.75	2.78	2.80	2.89	2.78	2.68	2.75	2.68	2.77	2.84	2.74	2.76	2.74	2.76
13	160402: Database management system Lab	2.18	2.09	2.09	1.77		1.99	2.36	1.82	2.25	1.64	1.98	2.02	2.13	2.23
14	160405: Programming Lab	1.87	1.87	1.88	1.59	1.88	1.94	1.93	1.89	1.86	1.44	1.86	1.86	1.90	1.86
15	160503: Theory of Computation	2.40	2.44	2.36	2.45	2.60	2.21	2.24	2.39	2.47	2.43	2.18	2.31	2.35	2.41
16	160502: Software Engineering	2.13	2.19	2.14	1.93	2.18	1.94	2.06	1.74	2.25	2.52	1.85	2.08	2.19	2.13
17	160504: Microprocessor & Interfacing	2.09	2.15	2.17	2.10	1.94	2.09	2.11	2.00	2.16	1.94	2.10	2.10	2.12	2.10
18	160501: Discrete Structures	2.08	2.49	2.95	2.68	2.48	2.71	2.23	2.65	2.52		2.62	2.56	2.69	2.21
19	160503: Theory of Computation LAB	2.74	2.77	2.72	2.90	3.00	2.74	2.63	2.76	2.74	3.00	2.82	2.81	2.75	2.75
20	160502: Software Engineering LAB	2.44	2.60	2.40	3.00	3.00	2.00	2.00	2.00	2.54	3.00	2.14	2.40	2.36	2.40
21	160601: CompilerDesign	2.61	2.64	2.59	2.91	2.62	2.55	2.55	2.84	2.68		2.62	2.61	2.59	2.57
22	160602: Computer Networks	2.27	2.29	2.14	2.81	2.52	1.90	1.93	2.00	2.28	2.72	1.98	2.19	2.12	2.22
23	160602: Agile Methodology	2.84	2.74	1.30	2.70	2.59	2.72	2.79	2.03	2.59	2.57	2.27	2.74	1.85	
24	160611: Network and Web security	2.54	2.44	2.43	2.74	1.77	2.48	2.63	2.66	2.42	2.51	2.45	2.49	2.39	2.52
25	160711: Networking with TCP/IP	2.79	2.79	2.89	3.00	2.81	2.78	2.80	2.98	2.78	2.83	2.84	2.89	2.89	2.84
26	BITL801: Image Processing	2.48	2.46	2.45	2.54	2.33	2.49	2.53	2.44	2.45	2.37	2.47	2.45	2.43	2.47
27	BITL802: Data warehouse and data Mining	2.30	2.35	2.25	2.05	2.45	2.27	2.04	2.40	2.36	2.16	2.45	2.23	2.32	2.23
28	BITL803: Neural Network and Fuzzy systems	2.24	2.25	2.25	2.15	2.27	2.20	2.32	1.95	2.26	2.55	2.09	2.22	2.28	2.22
29	BITL804: Internet of things and Application	2.36	2.34	2.35	2.51	2.27	2.37	2.29	2.39	2.33	2.55	2.46	2.44	2.38	2.35

	INDIRECT PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Survey 1	(Exit Survey)	1.84	1.87	1.79	1.88	1.85	1.87	1.92	1.96	1.93	2.01	1.95	1.94	1.89	1.91
Survey 2	(Alumni Survey)	2.10	2.10	2.06	2.14	2.01	2.08	2.08	2.12	2.14	2.19	2.26	2.23	2.15	2.10
Survey 3	(Employer Survey)	1.84	1.93	1.90	1.74	1.81	1.66	1.87	1.89	1.82	1.90	1.68	1.31	1.66	1.58

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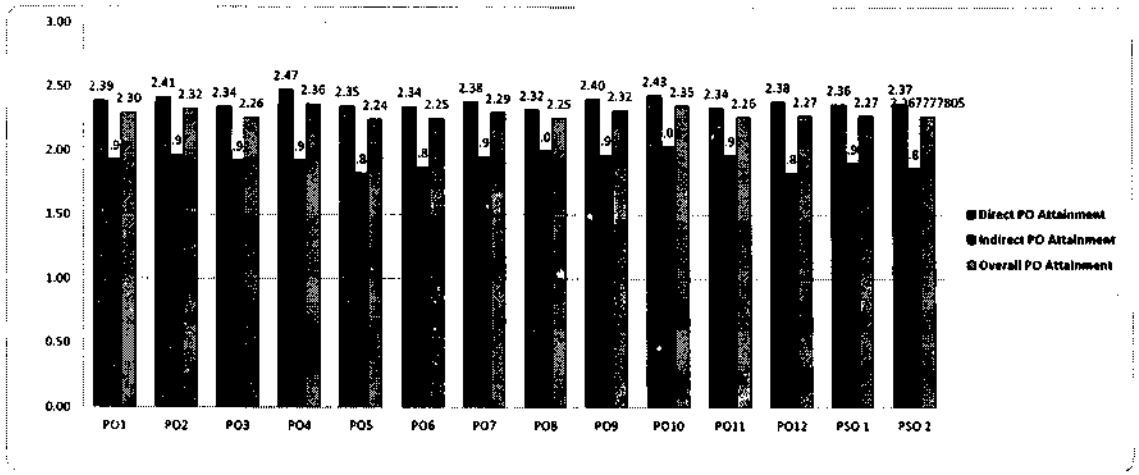
Department : Information Technology **Year** 2017-2021

Direct PO Attainment	2.39	2.41	2.34	2.47	2.35	2.34	2.38	2.32	2.40	2.43	2.34	2.38	2.36	2.37
Indirect PO Attainment	1.93	1.97	1.92	1.92	1.82	1.87	1.95	2.00	1.97	2.03	1.96	1.83	1.90	1.86
Overall PO Attainment	2.30	2.32	2.26	2.36	2.24	2.25	2.29	2.25	2.32	2.35	2.26	2.27	2.27	2.268



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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XVI

Curricula Feedback from Various Stakeholders for July - December 2021 to January - April 2022 Semester (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics/ Artificial Intelligence & Data Science/ Artificial Intelligence & Machine Learning)

[ITEM IT - 21]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Information Technology

Analysis Report of Feedback on Course Curriculum Collected from various Stakeholders

S.No.	Feedback Report	Page No.
1.	COURSE CURRICULUM FEEDBACK (July – December 2021) (V & VII Sem)	1-5
2	COURSE CURRICULUM FEEDBACK (September 2021 to January 2022) (III Sem)	6-11
3	COURSE CURRICULUM FEEDBACK (October 2021 – March 2022) (II Sem)	12-18
4	COURSE CURRICULUM FEEDBACK (January 2021 – April 2022) (IV)	19-24
5	COURSE CURRICULUM FEEDBACK (January 2021 – April 2022) (VI Sem)	24-28

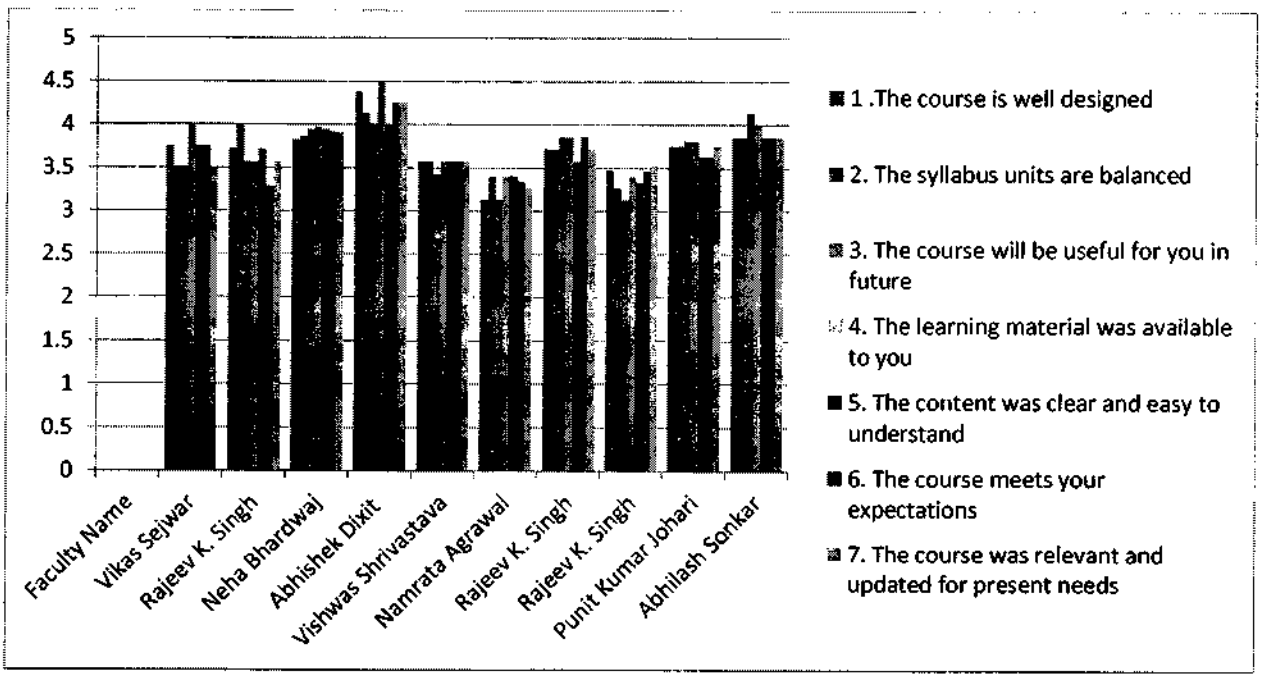
Session wise analysis and impact report: July – December 2021

- Based on the feedback data received from total 127 students and 10 faculty members (Fifth & Seventh semester- IT, for the academic session July - December 2021 following points have been analyzed.
- It has been observed that, in fifth semester **23.42%** of students are strongly agreed, **34.58%** of students are agreed, **33.04%** of students are neutral, **7.766%** of students are disagreed and only **1.155%** of students are strongly disagreed with the syllabus/ content that they have studied in the fifth semester.
- It has been noticed that, in fifth semester **26.11%** of students are strongly agreed, **32.22%** of students are agreed, **32.5625%** of students are neutral, **8.6%** of students are disagreed and only **0.475%** of students are strongly disagreed with the syllabus/ content that they have studied in the seventh semester.
- One of the Students of fifth semester has suggested updating the syllabus of Software Engineering.
- Students have suggested to add Data Science in one of the semesters.
- It has been observed that, in this session 50% of faculty members are strongly agreed, 40% of faculty members are agreed, and 10% of faculty members are disagree with the syllabus/ content that they have taught in the first semester.

COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 18 (Avg.)

Link of feedbacks	https://drive.google.com/drive/u/0/folders/19Cy8zC2a-QEPFs_SY_N6TdtL2VL1k_dr
Action Taken	After discussion with the subject faculty members, syllabus have been updated
	Data Science is one of the subject run from NPTEL and with this session it will run for all branches.

Subjects / Parameter(Average Grading)				1 .The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
Subject Code	Subject Name	Sem	Faculty Name							
160716	Mobile Computing (DE-3) (4)	7	Vikas Sejwar	3.75	3.5	3.5	4	3.75	3.75	3.5
900208	Soft Computing (OC-2) (6)	7	Rajeev K. Singh	3.714285	4	3.5714285	3.571428571	3.7142857	3.285714	3.5714285
900209	Network Security (OC-2) (35)	7	Neha Bhardwaj	3.828571	3.8571428	3.94285714	3.97142857	3.9428571	3.914285	3.9142857
900220	R Programming (OC-3) (8)	7	Abhishek Dixit	4.375	4.125	4	4.5	4	4.25	4.25
900222	Computer Networks (OC-3) (7)	7	Vishwas Shrivastava	3.5714285	3.571428	3.428571429	3.571428571	3.571428571	3.571428	3.571428
100008	Intellectual Property Rights (15)	7	Namrata Agrawal	3.133333333	3.4	3.133333333	3.4	3.4	3.333333	3.266666
100005	EEEM (14)	5	Rajeev K. Singh	3.714286	3.714286	3.857143	3.857143	3.571429	3.857143	3.714286
160502	Software Engineering (15)	5	Rajeev K. Singh	3.47	3.27	3.13	3.4	3.33	3.46	3.53
160504	Microprocessor & Interfacing (16)	5	Punit Kumar Johari	3.75	3.75	3.8125	3.8125	3.625	3.625	3.75
160503	Theory of Computation (7)	5	Abhilash Sonkar	3.857	3.857	4.14	4	3.857	3.857	3.857
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average										



Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160716	Mobile Computing (DE-3)	7	Vikas Sejwar	25	28.5	35.7	10.7	0
900208	Soft Computing (OC-2)	7	Rajeev K. Singh	6.12	67.34	14.28	8.16	4.08
900209	Network Security (OC-2)	7	Neha Bhardwaj	29.79	34.28	33.06	2.85	0
900220	R Programming (OC-3)	7	Abhishek Dixit	33.92	53.57	12.5	0	0
900222	Computer Networks (OC-3)	7	Vishwas Shrivastava	28.57	14.28	40.81	16.32	0
100008	Intellectual Property Rights	7	Namrata Agrawal	17.14	9.52	61.9	8.57	2.85
			Average in %	**23.423333**	**34.581667**	**33.041667**	**7.7666667**	**1.155**
100005	EEEM	5	Rajeev K. Singh	21.47	33.67	43.88	1.02	0
160502	Software Engineering	5	Rajeev K. Singh	23.8	20.95	47.6	5.71	1.9
160504	Microprocessor & Interfacing	5	Punit Kumar Johari	28.57	29.46	28.57	13.39	0
160503	Theory of Computation	5	Abhilash Sonkar	30.6	44.8	10.2	14.28	0
			Average in %	**26.11**	**32.22**	**32.5625**	**8.6**	**0.475**

COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Action / taken (threshold value 3.5)

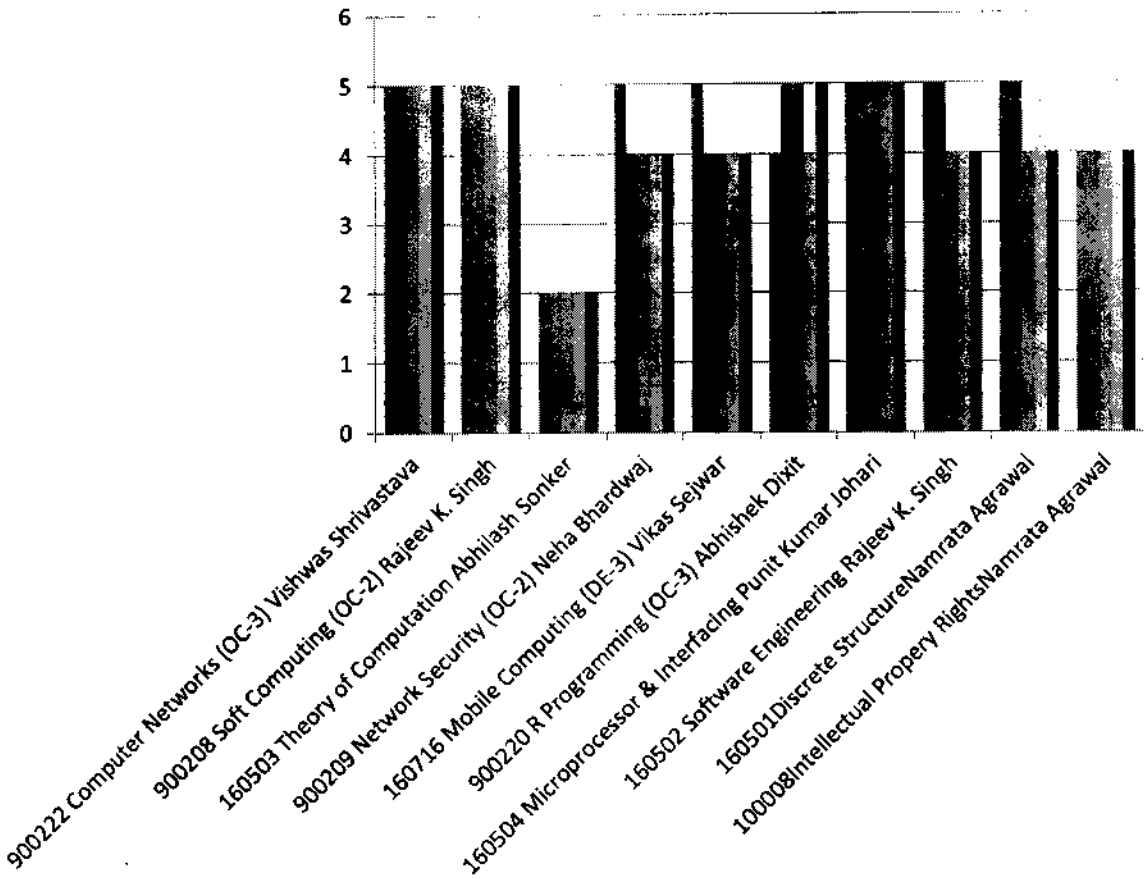
New programmes have been started from Dec 2020, so as per strength enough books are not available but it is already conveyed.

As per the scenario, people refer online materials. Our Institute has provided e-learning materials. Recommendation has sent to library to add new books as per new courses and strength of books.

	Parameter(Average Grading) / Subject name and faculty name	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
1	900222 Computer Networks (OC-3) Vishwas Shrivastava	5	5	5	5	5
2	900208 Soft Computing (OC-2) Rajeev K. Singh	5	5	5	5	5

3	160503 Theory of Computation Abhilash Sonker	2	2	2	2	2
4	900209 Network Security (OC-2) Neha Bhardwaj	5	4	4	4	4
5	160716 Mobile Computing (DE-3) Vikas Sejwar	5	4	4	4	4
6	900220 R Programming (OC-3) Abhishek Dixit	4	5	5	4	5
7	160504 Microprocessor & Interfacing Punit Kumar Johari	5	5	5	5	5
8	160502 Software Engineering Rajeev K. Singh	5	5	4	4	4
9	160501Discrete StructureNamrata Agrawal	5	5	4	5	4
10	100008Intellectual Propery RightsNamrata Agrawal	4	4	4	4	4
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)						

Q.No	Curriculum Evaluation Point	Strongly Agree	Agree	Neutral	disagree	Strongly disagree
1	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	70	20	0	10	0
2	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	60	30	0	10	0
3	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	40	50	0	10	0
4	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	40	50	0	10	0
5	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)	40	50	0	10	0
	Average in %	**50**	**40**	**0**	**10**	**0**



- 1. The availability of books & E-learning material in the institute is good. (Please give your opinion)
- 2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?
- 3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)
- 4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]
- 5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)

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Session wise analysis and impact report: September 2021 – January 2022

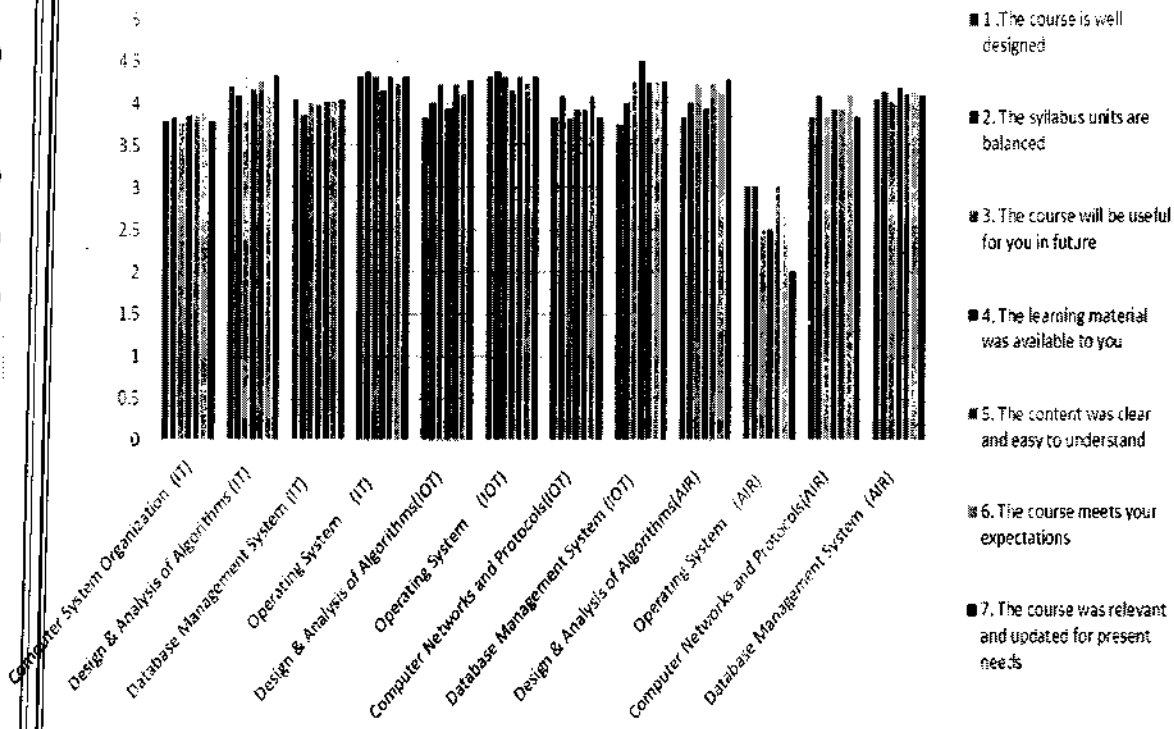
COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 30 (Avg.)

- Based on the feedback data received from total 143 students and 11 faculty members (Second semester-IT, IT (AIR), IT (IoT)) for the academic session Sept. 2021 to Jan. 2022, following points have been analysed.
- It has been observed that, in 3rd semester 35.72% of students are strongly agreed, 40.03% of students are agreed, 22.39% of students are neutral, 1.86% of students are disagreed and only 0% of students are strongly disagreed with the syllabus/ content that they have studied in the 3rd semester.
- It has been observed that, in first semester 83.6% of faculty members are strongly agreed and 16.4% of faculty members are agreed with the syllabus/ content that they have taught in the 3rd semester.

Sept. 2021 to Jan 2022 (3rd Sem)	**Student Feedback (Comments)**		**Response to student comments / Analysis**	**Remarks**
(160311) computer System and Organization (IT)	Mention the course / contents which in your opinion is outdated & needs to be removed.	No	These topics are already a part of higher semester subjects.	**Scheme has designed on the basis of branch and semester requirement**
	Is any new course required to meet current needs?	Python and data analytics		
(230302) Design and Analysis of Algorithms (IOT)	Is any new course required to meet current needs?	blockchain technology should add as a subject	These topics are already a part of higher semester subjects.	**Run through SWAYAM/NPTEL**
(240303) DBMS (AIR)	Mention the course / contents which in your opinion is outdated & needs to be removed.	Machine Learning	These contents are already part of next semester	**Subject name Machine Learning & optimization**
Link	https://drive.google.com/drive/folders/1ZAGuLDpPRA8Qxv5Pt-dV0sOQtvzaI4Az?usp=sharing			
Action/ Taken(threshold value 3.5)	Along with technical subjects, a student must want some more trending subjects in their upcoming semester.			

Parameter(Average Grading) / Subject Name and code		**1 .The course is well designed**	**2. The syllabus units are balanced**	**3. The course will be useful for you in future**	**4. The learning material was available to you**	**5. The content was clear and easy to understand**	**6. The course meets your expectations**	**7. The course was relevant and updated for present needs**
160311	Computer System Organization	3.79	3.83	3.76	3.86	3.86	3.88	3.79
160312	Design & Analysis of Algorithms	4.21	4.10	4.31	4.17	4.26	4.38	4.33

160313	Database Management System	4.05	3.85	4.00	3.98	4.02	4.05	4.05
160314	Operating System	4.31	4.38	4.31	4.15	4.31	4.23	4.31
230301	Design & Analysis of Algorithms	3.83	4.00	4.22	3.94	4.22	4.11	4.28
230302	Operating System	4.31	4.38	4.31	4.15	4.31	4.23	4.31
230303	Computer Networks and Protocols	3.83	4.08	3.83	3.92	3.92	4.08	3.83
230304	Database Management System	3.75	4.00	4.25	4.50	4.25	4.25	4.25
240301	Design & Analysis of Algorithms	3.83	4.00	4.22	3.94	4.22	4.11	4.28
240302	Operating System	3.00	3.00	2.50	2.50	3.00	3.00	2.00
240303	Computer Networks and Protocols	3.83	4.08	3.83	3.92	3.92	4.08	3.83
240304	Database Management System	4.05	4.13	4	4.18	4.1	4.13	4.08
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)								



Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160311	Computer System Organization	3	Prof. Neha Bhardwaj	22.11	43.88	28.23	5.78	0.00
160312	Design & Analysis of Algorithms	3	Prof. Abhishek Dixit	41.16	44.22	13.27	1.36	0.00
160313	Database Management System	3	Prof. Punit Kumar Johari	29.30	44.79	22.52	3.39	0.00
160314	Operating System	3	Dr. Sanjiv Sharma	40.66	47.25	12.09	0.00	0.00
230301	Design & Analysis of Algorithms	3	Prof. Vishwas Shrivastava	38.10	32.54	29.37	0.00	0.00
230302	Operating System	3	Prof. Vikash Sejwar	40.66	47.25	12.09	0.00	0.00
230303	Computer Networks and Protocols	3	Prof. Abhilash Sonkar	29.76	38.1	27.38	4.76	0
230304	Database Management System	3	Dr. Saumil Maheshwari	39.19	32.23	27.47	1.1	0
240301	Design & Analysis of Algorithms	3	Prof. Vishwas Shrivastava	38.10	32.54	29.37	0.00	0.00

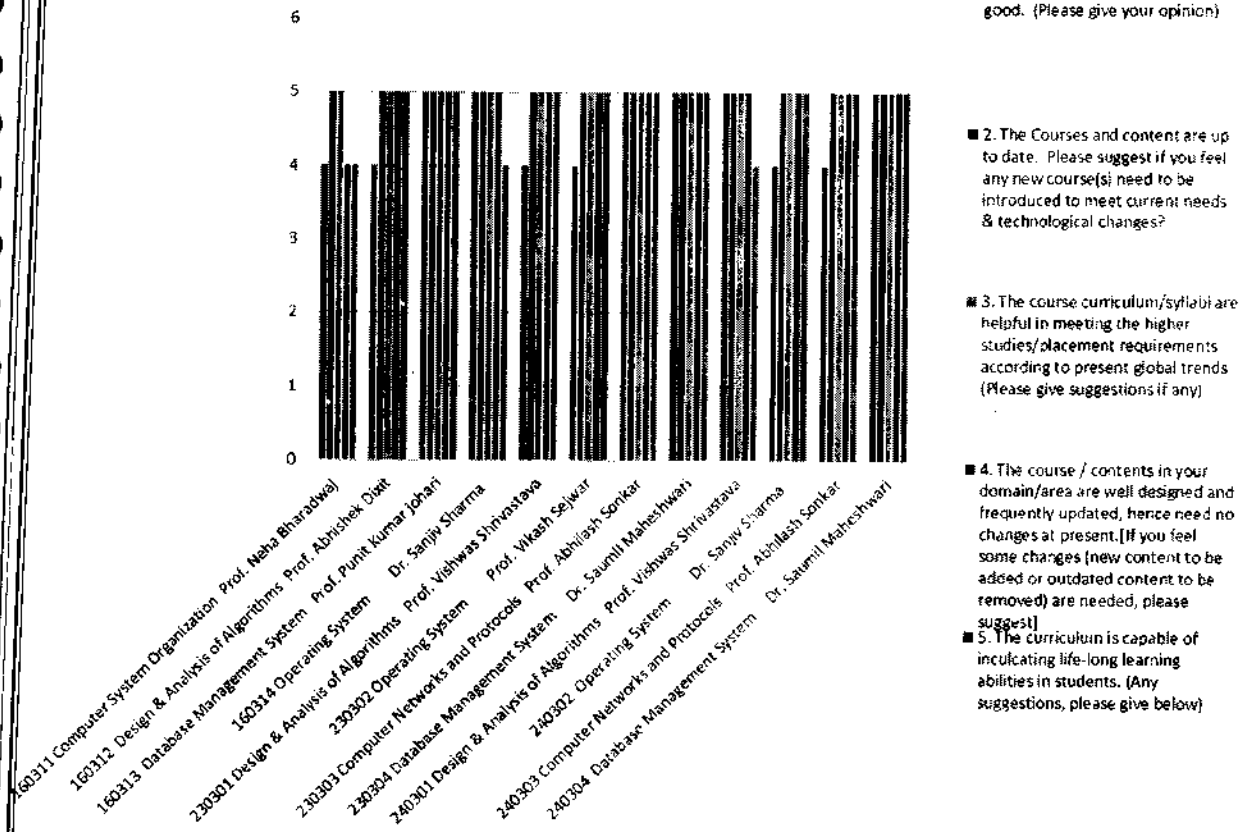
240302	Operating System	3	Dr. Sanjiv Sharma	40.66	47.25	12.09	0.00	0.00
240303	Computer Networks and Protocols	3	Prof. Abhilash Sonkar	29.76	38.1	27.38	4.76	0
240304	Database Management System	3	Dr. Saumil Maheshwari	39.19	32.23	27.47	1.1	0
			Average	35.72	40.03	22.39	1.86	0

COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Action / taken (threshold value 3.5)
As per strength enough books are not available in library but it is already conveyed. As per the scenario, people refer online materials. Our Institute has provided e-learning materials.

Parameter(Average Grading) / Subject Name	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.]If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
160311 Computer System Organization Prof. Neha Bharadwaj	4	5	5	4	4
160312 Design & Analysis of Algorithms Prof. Abhishek Dixit	4	5	5	5	5
160313 Database Management System Prof. Punit Kumar Johari	5	5	5	5	5
160314 Operating System Dr. Sanjiv Sharma	5	5	5	5	4
230301 Design & Analysis of Algorithms Prof. Vishwas Shrivastava	4	5	5	5	5
230302 Operating System Prof. Vikash Sejwar	4	5	5	5	5
230303 Computer Networks and Protocols Prof. Abhilash Sonkar	5	5	5	5	5

230304 Database Management System Dr. Saumil Maheshwari	5	5	5	5	5
240301 Design & Analysis of Algorithms Prof. Vishwas Shrivastava	5	5	5	5	4
240302 Operating System Dr. Sanjiv Sharma	4	5	5	5	5
240303 Computer Networks and Protocols Prof. Abhilash Sonkar	4	5	5	5	5
240304 Database Management System Dr. Saumil Maheshwari	5	5	5	5	5



Curriculum Evaluation Point	Response in %				
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The availability of books & E-learning material in the institute is good	0	0	0	50	50
The Courses and content are up to date.	0	0	0	0	100

The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	0	0	0	0	100
The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	0	0	0	8	92
The curriculum is capable of inculcating life-long learning abilities in students.	0	0	0	25	75
Average	0.00	0	0	16.6	83.4

Session wise analysis and impact report: October 2021 to March 2022

- Based on the feedback data received from total 405 students and 06 faculty members (First semester- IT, IT (AIR), IT (IoT), IT (AIML), IT (AIDS) for the academic session October 2021 to March 2022, following points have been analysed.
- It has been observed that, in first semester 39.01% of students are strongly agreed, 33.24% of students are agreed, 20.80% of students are neutral, 4.94% of students are disagreed and only 2.01% of students are strongly disagreed with the syllabus/ content that they have studied in the first semester.
- Students have suggested to add soil management, Ecology, security in IoT, web development, Bootstrap, app development, Data science, CPP, Machine learning, Ethical Hacking and Python under new course, Minor specialization and departmental electives. (These subjects are already the part of curriculum in higher semesters).
- Some students has suggested to add Energy and its types, About soil management, Ecology in EEES, linear algebra in mathematics (These topics are already the part of syllabus).
- It has been observed that, in first semester 75.71% of faculty members are strongly agreed, 12.86% of faculty members are agreed, and 7.14% of faculty members are neutral with the syllabus/ content that they have taught in the first semester.

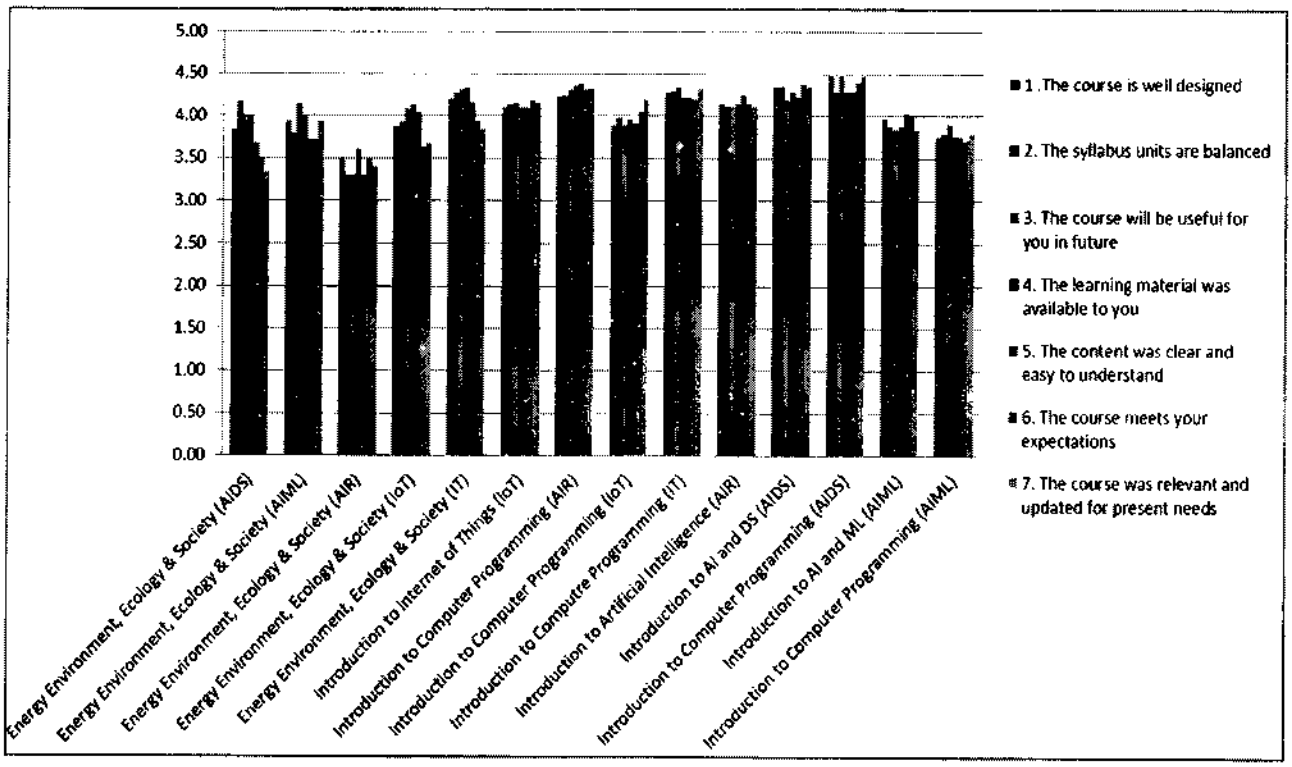
COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 30 (Avg.)

Oct. to March 2022 (1st sem)	Student Feedback (Comments)		Response to student comments / Analysis	Remarks
(100015) Energy Environment, Ecology & Society (AIML)	Mention the course / contents which in your opinion is outdated & needs to be removed.	Energy and its types.	These topics are required to meet the course objective of the subject As per request of students, subject related to web development and app development can be offered in DLC. Minor specialization subjects are offered by other departments.	**Suggested and discussed in BoS meeting**
	Is any new course required to meet current needs?	About soil management, Ecology		
	Honours	website making		
	Minor specialization	web development		
	Departmental electives	app development		
(230101)Introduction to Internet of Things (IOT)	Is any new course required to meet current needs?	security in IoT,	These topics are already a part of higher semester subjects. As per request of students, subject related to web development and app development can be offered in DLC. CPP is in second semester in all pragrammes	
	Honours	Web development, CPP language		
	Minor specialization	Web development,		
	Departmental electives	IT, Bootstrap		
	Open electives	Skill development, Real programs		
(270101)Introduction to AI and DS (AIDS)	Mention the course / contents which in your opinion is outdated & needs to be removed.	AI methodology, I guess this course needs to be more structured.	These topics are already a part of higher semester subjects. Only introductory part it is running in 1st sem.	Run through NPTEL

	Is any new course required to meet current needs?	Data science	This subject is already a part of higher semester.	
(270102, 280102, 230102) Introduction to Computer Programming (AIDS, AIML, IoT)	Mention the course / contents which in your opinion is outdated & needs to be removed.	linear algebra	linear algebra is essential as mathematical foundation for AI based programmes The subjects (CPP, Python, Networking, and Ethical hacking) are already a part of curriculum and offered in higher semesters under Open category. For practice, more programmes will be added.	
	Name course / contents which needs to be updated.	more practical problems		
	Is any new course required to meet current needs?	C++ must be included, I think we should start from Python language, About Ethical Hacking, Python, Training AI		
	Honours	Python Programming		
	Minor specialization	Mathematics, Economics		
	Departmental electives	Machine learning, Ethical Hacking, Economics		
	Open electives	Networking, Economics		
Link	**https://drive.google.com/drive/folders/1tX3Ughu6bABhGfCpbTTk3fzlvlghMpZV?usp=sharing**			
Action/ Taken (threshold value 3.5)	Along with technical subjects, a student must aware of the environment & society so EEES is the part of curriculum. After discussion with the subject faculty members, syllabus has updated After discussion with HOD and faculty members subject such as web and app development, Bootstrap will include in curriculum.			

Parameter(Average Grading) / Subject Name and code		**1 .The course is well designed**	**2. The syllabus units are balanced**	**3. The course will be useful for you in future**	**4. The learning material was available to you**	**5. The content was clear and easy to understand**	**6. The course meets your expectations**	**7. The course was relevant and updated for present needs**
100015	Energy Environment, Ecology & Society (AIDS) (6)	3.83	4.17	4.00	4.00	3.67	3.50	3.33
100015	Energy Environment, Ecology & Society (AIML) (14)	3.93	3.79	4.14	4.00	3.71	3.71	3.93
100015	Energy Environment, Ecology & Society (AIR) (10)	3.50	3.30	3.30	3.60	3.30	3.50	3.40
100015	Energy Environment, Ecology & Society (IoT) (24)	3.88	3.92	4.08	4.13	4.04	3.63	3.67
100015	Energy Environment, Ecology & Society (IT) (45)	4.20	4.27	4.31	4.33	4.16	3.93	3.84
230101	Introduction to Internet of Things (IoT) (32)	4.09	4.13	4.16	4.09	4.09	4.19	4.16

230102	Introduction to Computer Programming (AIR) (51)	4.22	4.24	4.31	4.35	4.37	4.31	4.33
230102	Introduction to Computer Programming (IoT) (42)	3.88	3.98	3.88	3.95	3.90	4.05	4.19
230102	Introduction to Computer Programming (IT) (49)	4.27	4.29	4.35	4.20	4.20	4.18	4.33
240101	Introduction to Artificial Intelligence (AIR) (29)	4.14	4.10	4.10	4.14	4.24	4.14	4.10
270101	Introduction to AI and DS (AIDS) (32)	4.34	4.34	4.19	4.28	4.22	4.38	4.34
270102	Introduction to Computer Programming (AIDS) (25)	4.48	4.28	4.48	4.28	4.28	4.40	4.48
280101	Introduction to AI and ML (AIML) (31)	3.97	3.87	3.84	3.87	4.03	4.00	3.84
280102	Introduction to Computer Programming (AIML) (47)	3.74	3.79	3.89	3.77	3.74	3.70	3.79
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)								



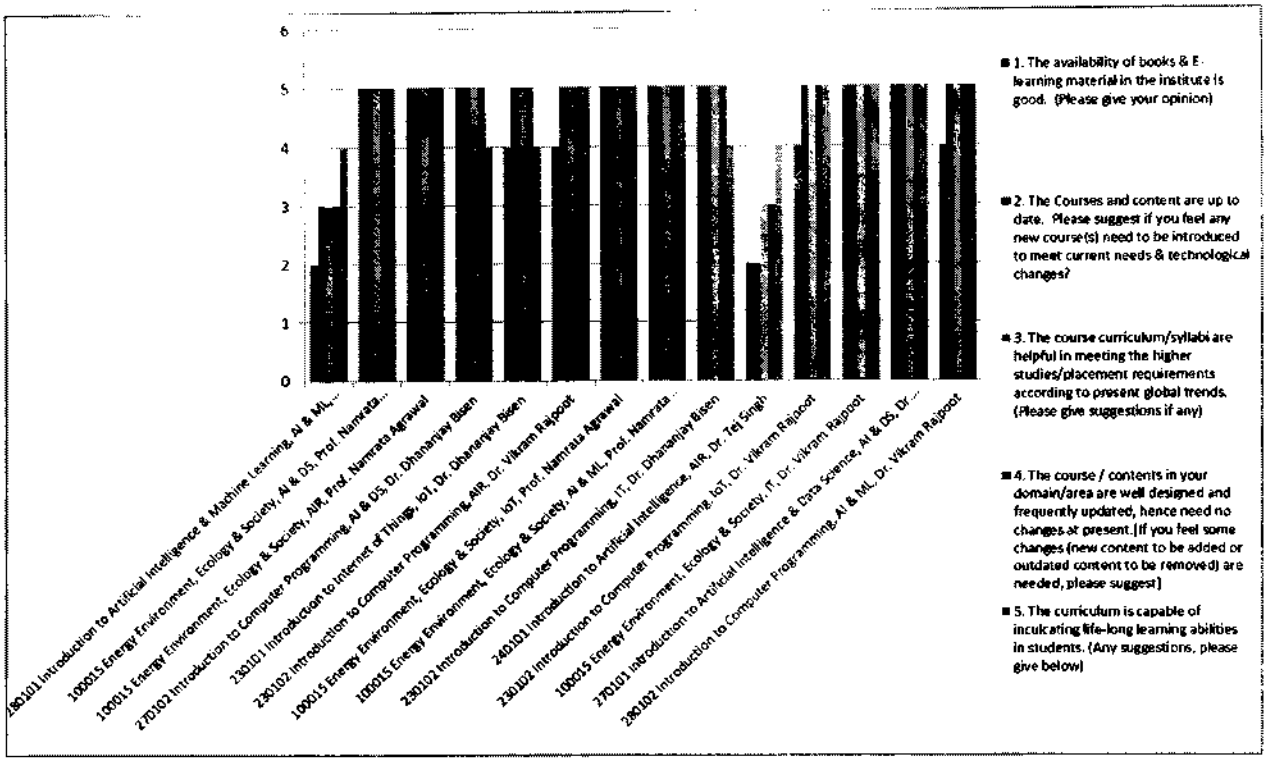
Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
100015	Energy Environment, Ecology & Society (AIDS)	1	Prof. Namrata Agrawal	28.57	35.71	26.19	4.76	4.76
100015	Energy Environment, Ecology & Society (AIML)	1	Dr. Vikram Rajpoot	26.53	40.82	28.57	3.06	1.02
100015	Energy Environment, Ecology & Society (AIR)	1	Dr. Vikram Rajpoot	18.57	21.43	42.86	17.14	0.00
100015	Energy Environment, Ecology & Society (IoT)	1	Prof. Namrata Agrawal	30.95	36.31	26.19	5.36	1.19
100015	Energy Environment, Ecology & Society (IT)	1	Dr. Vikram Rajpoot	44.44	31.43	20.00	2.86	1.27
230101	Introduction to Internet of Things (IoT)	1	Dr. Dhananjay Bisen	43.30	29.46	24.55	2.23	0.45
230102	introduction to Computer Programming (AIR)	1	Dr. Vikram Rajpoot	53.22	28.85	13.45	4.20	0.28
230102	Introduction to Computer Programming (IoT)	1	Dr. Vikram Rajpoot	31.63	37.41	27.89	3.06	0.00
230102	Introduction to Computer Programming (IT)	1	Dr. Dhananjay Bisen	45.77	37.90	13.99	1.17	1.17
240101	Introduction to Artificial Intelligence (AIR)	1	Dr. Tej Singh	46.31	35.47	8.87	4.43	4.93
270101	Introduction to AI and DS (AIDS)	1	Dr. Pawan Dubey	51.34	29.91	16.07	2.68	0.00
270102	Introduction to Computer Programming (AIDS)	1	Dr. Dhananjay Bisen	56.57	26.86	14.86	1.71	0.00
280101	Introduction to AI and ML (AIML)	1	Dr. Tej Singh	40.09	35.48	9.22	6.45	8.76
280102	Introduction to Computer Programming (AIML)	1	Dr. Vikram Rajpoot	28.88	38.30	18.54	10.03	4.26
			Average	39.01	33.24	20.80	4.94	2.01

COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Action / taken (**threshold value 3.5**)
New programmes (AIML, AIR) have been started from Dec 2020, so as per strength enough books are not available in library but it is already conveyed. As per the scenario, people refer online materials. Our Institute has provided e-learning materials.
Introduction to Artificial Intelligence & Machine Learning and Introduction to Artificial Intelligence are the fundamental subject of AIML and AIR respectively, basic and core subjects knowledge are covered here. Gradually the level and new concepts of programming has incorporated in higher semesters and accordingly syllabus, course content will be updated.
Link: https://drive.google.com/drive/folders/1B9EOFZo56p8gmDmX8RK0WQ0C3vh_hLSx?usp=sharing

Parameter (Average Grading) / Subject Name and faculty name	**1. The availability of books & E-learning material in the institute is good. (Please give your opinion)**	**2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?**	**3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)**	**4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]**	**5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)**
280101 Introduction to Artificial Intelligence & Machine Learning, AI & ML, Dr. Tej Singh	2	3	3	3	4
100015 Energy Environment, Ecology & Society, AI & DS, Prof. Namrata Agrawal	5	5	5	5	5
100015 Energy Environment, Ecology & Society, AIR, Prof. Namrata Agrawal	5	5	5	5	5
270102 Introduction to Computer Programming, AI & DS, Dr. Dhananjay Bisen	5	5	5	5	4
230101 Introduction to Internet of Things, IoT, Dr. Dhananjay Bisen	4	5	5	5	4

230102 Introduction to Computer Programming, AIR, Dr. Vikram Rajpoot	4	5	5	5	5
100015 Energy Environment, Ecology & Society, IoT, Prof. Namrata Agrawal	5	5	5	5	5
100015 Energy Environment, Ecology & Society, AI & ML, Prof. Namrata Agrawal	5	5	5	5	5
230102 Introduction to Computer Programming, IT, Dr. Dhananjay Bisen	5	5	5	5	4
240101 Introduction to Artificial Intelligence, AIR, Dr. Tej Singh	2	2	3	3	4
230102 Introduction to Computer Programming, IoT, Dr. Vikram Rajpoot	4	5	5	5	5
100015 Energy Environment, Ecology & Society, IT, Dr. Vikram Rajpoot	5	5	5	5	5
270101 Introduction to Artificial Intelligence & Data Science, AI & DS, Dr. Pawan Dudey	5	5	5	5	5
280102 Introduction to Computer Programming, AI & ML, Dr. Vikram Rajpoot	4	5	5	5	5



Curriculum Evaluation Point	Response in %				
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The availability of books & E-learning material in the institute is good	0	14.29	0	28.57	57.14
The Courses and content are up to date.	0	7.14	7.14	0	85.71
The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	0	0	14.29	0	85.71
The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	0	0	14.29	0	85.71
The curriculum is capable of inculcating life-long learning abilities in students.	0	0	0	35.71	64.29
	0.00	4.29	7.14	12.86	75.71

Session wise analysis and impact report: January to April 2022

- Based on the feedback data received from total 305 students and 12 faculty members (fourth semester- IT, IT (AIR), IT (IoT), IT (MAC), IT (EE-IoT) for the academic session January to April 2022, following points have been analysed.
- It has been observed that, in fourth semester 41.09% of students are strongly agreed, 33.16% of students are agreed, 20.12% of students are neutral, 4.76% of students are disagreed and only 0.87% of students are strongly disagreed with the syllabus/ content that they have studied in semester.
- Students have suggested to add new courses such as IoT communication and connections, Database design, SQL, NoSql, Web Development, Design for internet of things, Practical of cloud computing under to meet current needs and Honours.
- Some students have suggested to add some topics such as agile model, Access Controls, Remote Access VPN, Zero Trust Network Access (ZTNA), Data Loss Prevention (DLP), Intrusion Prevention Systems (IPS), Hyperscale Network Security, Cloud Network Security under update course/contents. (Students cover these topics are higher semesters).
- It has been observed that, in fourth semester 42.22% of faculty members are strongly agreed, 37.78% of faculty members are agreed, and 15.55% of faculty members are neutral with the syllabus/ content that they have taught in the fourth semester.

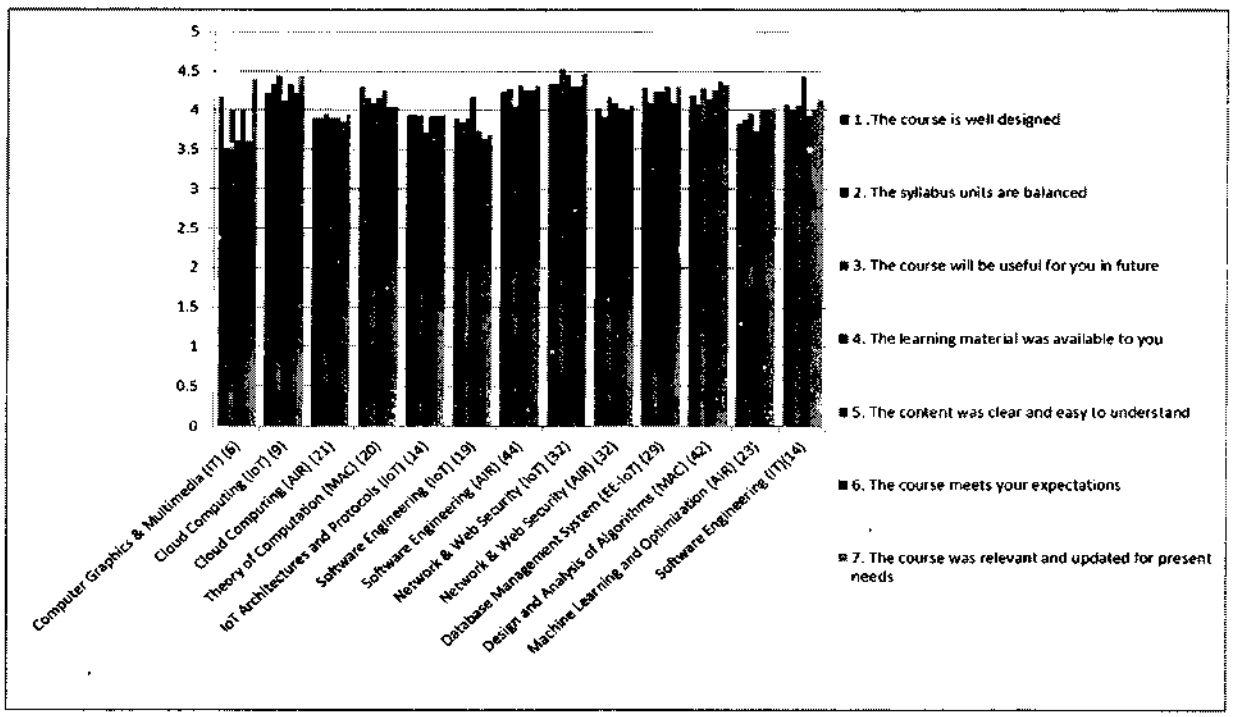
COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 23 (Avg.)

January to April 2022 (IV sem)	**Student Feedback (Comments)**		**Response to student comments / Analysis**	**Remarks**
(230402) Cloud Computing (IoT)	**Name course / contents which needs to be updated.**	Practical of cloud computing	That matter will put into departmental meeting (consisting of HOD and faculty members) and committee will check the importance of subject and decide. We will do the needful.	**Suggestion**
(230404) IoT Architectures and Protocols (IoT)	Is any new course required to meet current needs?	IoT communication and connections	This topic is the part of Introduction to IoT, has discussed in brief and in detail will be discussed higher semesters.	
(230403) Software Engineering (IoT)	Name course / contents which needs to be updated.	agile model in 1st unit	This matter was put into BoS meeting and the same will be updated in the subject.	
(230405) Network & Web Security (IoT)	Name course / contents which needs to be updated	Access Controls, Remote Access VPN, Zero Trust Network Access (ZTNA), Data Loss Prevention (DLP), Intrusion Prevention Systems (IPS), Hyperscale Network Security, Cloud Network Security	This matter was put into BoS meeting and the essential topics will be updated in the subject	Suggestion

(220401) Database Management System (EE-IoT)	Mention the course / contents which in your opinion is out dated & needs to be removed.	-As of now mysql isn't much used in industry , oracle is used so instead of mysql , oracle should've been the in the syllabus -More labs are required	Students are free to use any technology (backend end/ database) while designing projects. Faculty members as mentors help them to learn. As per curriculum, mentioned labs are sufficient for that subject but if students need they can use labs to perform experiments related to DBMS in free slots. Faculty members as mentors help them to learn.	
	Name course / contents which needs to be updated	Database design Sql should be taught more	The subject is already a part of syllabus.	
	Is any new course required to meet current needs?	NoSql Web Development	Mini skill project associated with practical subjects enhance think & design capability. Student can use NoSql as backend technology in web development	
	Honours	Design for internet of things	The subject is already a part of syllabus and offered in higher semesters through NPTEL.	
Link	https://drive.google.com/drive/folders/1s7wlKfGzVFE_Z2mQoln1PKJ2vavUPw5D?usp=sharing			
Action/ Taken (threshold value 3.5)	MYSQL is open source software required to implement concept of DBMS. Most of the IT companies are working on that technology so it is important for students as well as many applications of higher learning require this technology as prerequisite.			

Parameter (Average Grading) / Subject Name and code		**1 .The course is well designed**	**2. The syllabus units are balanced**	**3. The course will be useful for you in future**	**4. The learning material was available to you**	**5. The content was clear and easy to understand**	**6. The course meets your expectations**	**7. The course was relevant and updated for present needs**
160411	Computer Graphics & Multimedia (IT) (6)	4.16	3.5	4	3.6	4	3.6	4.4
230402	Cloud Computing (IoT) (9)	4.22	4.33	4.44	4.11	4.33	4.22	4.44
240402	Cloud Computing (AIR) (21)	3.90	3.90	3.95	3.90	3.90	3.85	3.95
250403	Theory of Computation (MAC) (20)	4.30	4.15	4.10	4.15	4.25	4.05	4.05
230404	IoT Architectures and Protocols (IoT) (14)	3.93	3.93	3.93	3.71	3.93	3.93	3.93

230403	Software Engineering (IoT) (19)	3.89	3.84	3.89	4.16	3.74	3.63	3.68
240403	Software Engineering (AIR) (44)	4.23	4.27	4.05	4.32	4.25	4.25	4.32
230405	Network & Web Security (IoT) (32)	4.34	4.34	4.53	4.44	4.31	4.31	4.47
240405	Network & Web Security (AIR) (32)	4.03	3.91	4.16	4.09	4.03	4.00	4.06
220401	Database Management System (EE-IoT) (29)	4.28	4.10	4.24	4.24	4.31	4.10	4.31
250404	Design and Analysis of Algorithms (MAC) (42)	4.19	4.07	4.29	4.14	4.26	4.38	4.33
240404	Machine Learning and Optimization (AIR) (23)	3.83	3.87	3.96	3.74	4.00	4.00	4.04
160412	Software Engineering (IT)(14)	4.07	4.00	4.07	4.43	3.93	4.00	4.14
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Satisfactory, 1: Poor)								



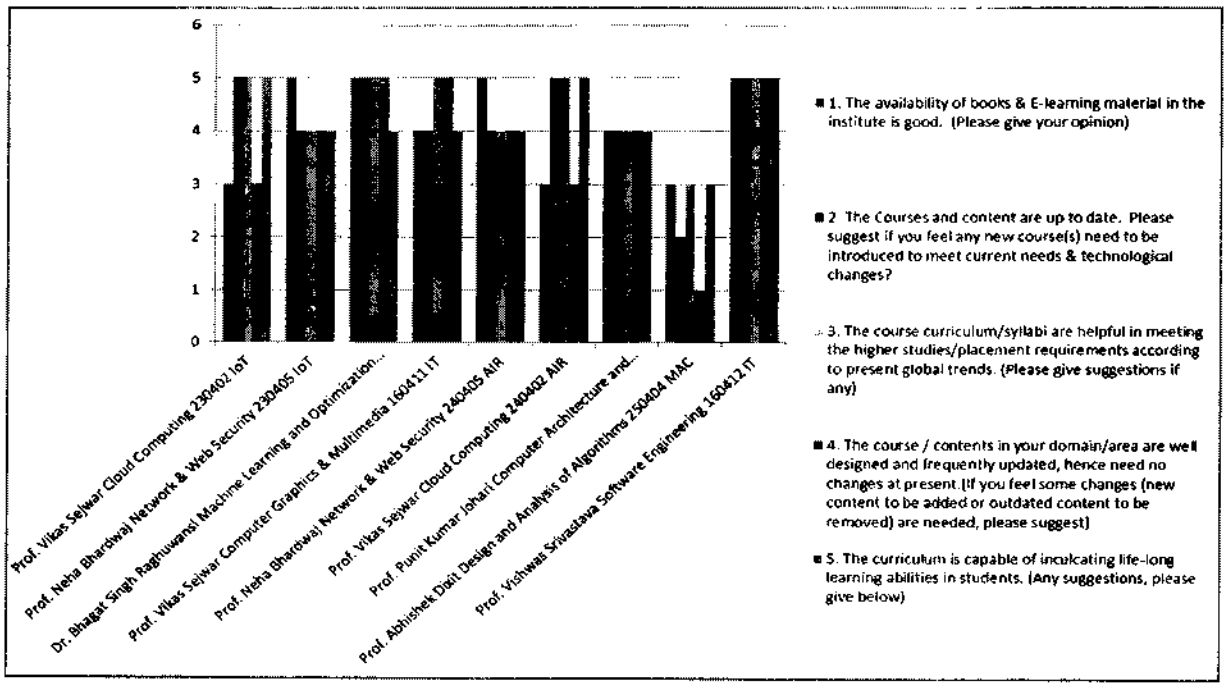
Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160411	Computer Graphics & Multimedia (IT)	IV	Prof. Vikas Sejwar	38.10	26.19	23.81	11.90	0.00
230402	Cloud Computing (IoT)	IV	Prof. Vikas Sejwar	53.97	28.57	11.11	6.35	0.00
240402	Cloud Computing (AIR)	IV	Prof. Vikas Sejwar	28.57	36.73	31.97	2.72	0.00
250403	Theory of Computation (MAC)	IV	Prof. Abhilash Sonker	40.71	35.71	21.43	2.14	0.00
230404	IoT Architectures and Protocols (IoT)	IV	Prof. Abhilash Sonker	31.63	38.78	19.39	8.16	2.04
230403	Software Engineering (IoT)	IV	Prof. Rajeev Kumar Singh	36.84	25.56	27.07	5.26	5.26
240403	Software Engineering (AIR)	IV	Prof. Rajeev Kumar Singh	52.60	24.35	18.51	3.57	0.97
230405	Network & Web Security (IoT)	IV	Prof. Neha Bhardwaj	56.70	28.57	12.05	2.68	0.00
240405	Network & Web Security (AIR)	IV	Prof. Neha Bhardwaj	31.70	43.30	22.32	2.68	0.00
220401	Database Management System (EE-IoT)	IV	Dr. Saumil Maheshwari	46.31	32.51	18.72	2.46	0.00
250404	Design and Analysis of Algorithms (MAC)	IV	Prof. Abhishek Dixit	41.16	44.22	13.27	0.00	1.36
240404	Machine Learning and Optimization (AIR)	IV	Dr. Bhagat Singh Raghuwansi	27.95	44.10	20.50	6.83	0.62
160412	Software Engineering (IT)	IV	Prof. Vishwas Srivastava	47.96	22.45	21.43	7.14	1.02
			Average	41.09	33.16	20.12	4.76	0.87

COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Action / taken (threshold value 3.5)
New programmes (IoT, AIR, MAC, EE-IoT) have been started recently, so as per strength enough books are not available in library but it is already conveyed. As per the scenario, people refer online materials. Our Institute has provided e-learning materials.
Syllabus is updated as per the requirement of current scenario.
Link: https://drive.google.com/drive/folders/1INzmESjL-j6mFjGJVrRQnPjH4MCxqc5P?usp=sharing

Parameter (Average Grading) / **Subject name and faculty name**	**1. The availability of books & E-learning material in the institute is good. (Please give your opinion)**	**2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?**	**3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)**	**4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]**	**5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)**
Prof. Vikas Sejwar Cloud Computing 230402 IoT	3	5	5	3	5
Prof. Neha Bhardwaj Network & Web Security 230405 IoT	5	4	4	4	4
Dr. Bhagat Singh Raghuwansi Machine Learning and Optimization 240404 AIR	5	5	5	5	4
Prof. Vikas Sejwar Computer Graphics & Multimedia 160411 IT	4	4	5	5	4
Prof. Neha Bhardwaj Network & Web Security 240405 AIR	5	4	4	4	4
Prof. Vikas Sejwar Cloud Computing 240402 AIR	3	5	5	3	5
Prof. Punit Kumar Johari Computer Architecture and Microprocessor 230401 IoT	4	4	4	4	4

Prof. Abhishek Dixit Design and Analysis of Algorithms 250404 MAC	3	2	3	3	3
Prof. Vishwas Srivastava Software Engineering 160412 IT	5	5	5	5	5



Curriculum Evaluation Point	Response in %				
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The availability of books & E-learning material in the institute is good	0	0	33.33	22.22	44.44
The Courses and content are up to date.	0	11.11	0	44.44	44.44
The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	0	0	11.11	33.33	55.56
The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	0	11.11	22.22	33.33	33.33
The curriculum is capable of inculcating life-long learning abilities in students.	0	0	11.11	55.56	33.33
	0.00	4.44	15.55	37.78	42.22

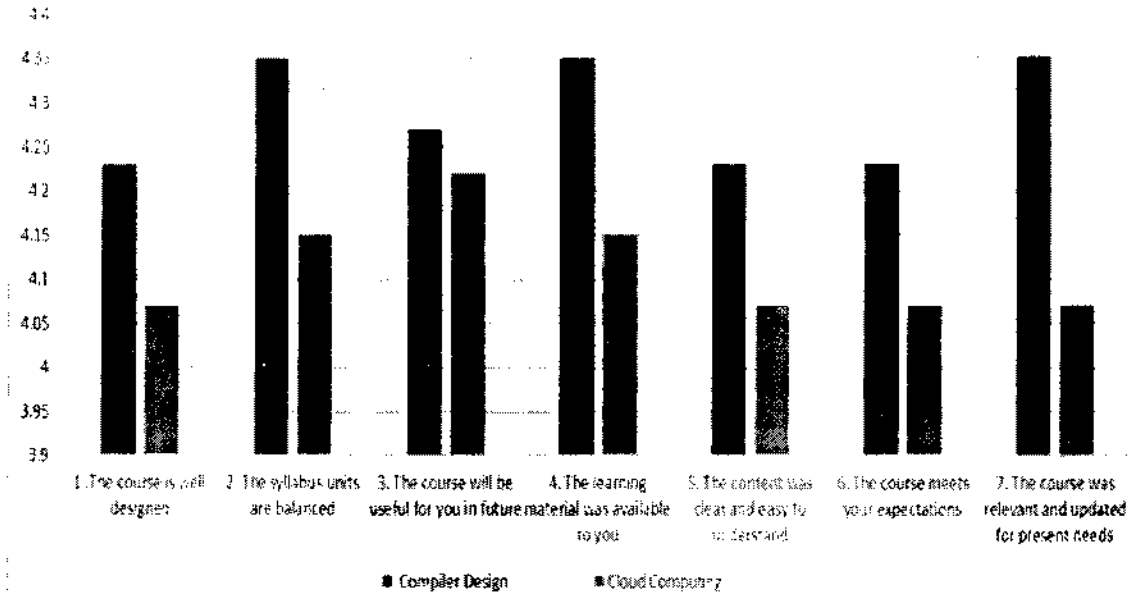
Session wise analysis and impact report: January -April 2022

COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 30 (Avg.)

- Based on the feedback data received from total 56 students and 11 faculty members (sixth sem.- IT) for the academic session Jan. to April 2022, following points have been analysed.
- It has been observed that, in sixth semester 51.18% of students are strongly agreed, 24.33% of students are agreed, 18.54% of students are neutral, 3.54% of students are disagreed and only 2.2% of students are strongly disagreed with the syllabus/ content that they have studied in the sixth semester.
- It has been observed that, in first semester 60% of faculty members are strongly agreed, 32.4% of faculty members are agreed and 7.6% of faculty are neutral with the syllabus/ content that they have taught in the sixth semester.

Jan to April 2022 (VI sem)	
Link	https://drive.google.com/drive/folders/1ZAGuLDpPRA8Qxy5Pt-dV0sOQtvza14Az?usp=sharing
Action/ Taken (threshold value 3.5)	No comments have received.

Parameter (Average Grading) / Subject Name and code		1 .The course is well designed	2. The syllabus units are balanced	3. The course will be useful for you in future	4. The learning material was available to you	5. The content was clear and easy to understand	6. The course meets your expectations	7. The course was relevant and updated for present needs
160601	Compiler Design	4.23	4.35	4.27	4.35	4.23	4.23	4.35
160614	Cloud Computing	4.07	4.15	4.22	4.15	4.07	4.07	4.07
Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)								

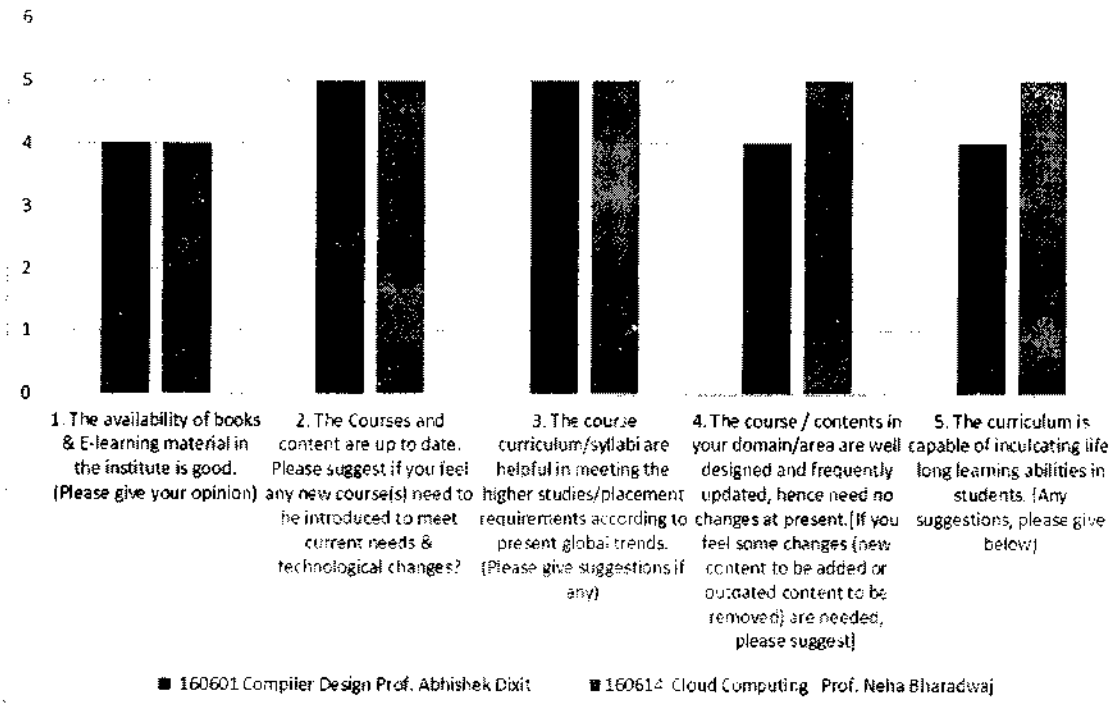


Subject Code	Subject Name	Semester	Faculty Name	Strongly Agree in %	Agree in %	Neutral in %	Disagree in %	Strongly disagree in %
160601	Compiler Design	6	Prof. Abhishek Dixit	59.89	18.68	15.93	1.10	4.40
160614	Cloud Computing	6	Prof. Neha Bharadwaj	45.50	26.98	21.16	6.35	0.00
			Average	51.18	24.33	18.54	3.75	2.2

COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

Action / taken (threshold value 3.5)
As per strength enough books are not available in library but it is already conveyed. As per the scenario, people refer online materials. Our Institute has provided e-learning materials.

Parameters (Average Grading) / **Subject Name and Faculty name**	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. (Please give suggestions if any)	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed, please suggest]	5. The curriculum is capable of inculcating life-long learning abilities in students. (Any suggestions, please give below)
160601 Compiler Design Prof. Abhishek Dixit	4	5	5	4	4
160614 Cloud Computing Prof. Neha Bharadwaj	4	5	5	5	5



Curriculum Evaluation Point	Response in %				
	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The availability of books & E-learning material in the institute is good	0	0	10	40	50
The Courses and content are up to date.	0	0	0	44	56
The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	0	0	16	30	54
The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	0	0	0	10	90
The curriculum is capable of inculcating life-long learning abilities in students.	0	0	12	38	50
	0.00	0	7.6	32.4	60

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Department of Information Technology

Alumni Feedback

Analysis and Impact report: (Batch 2017-2021)

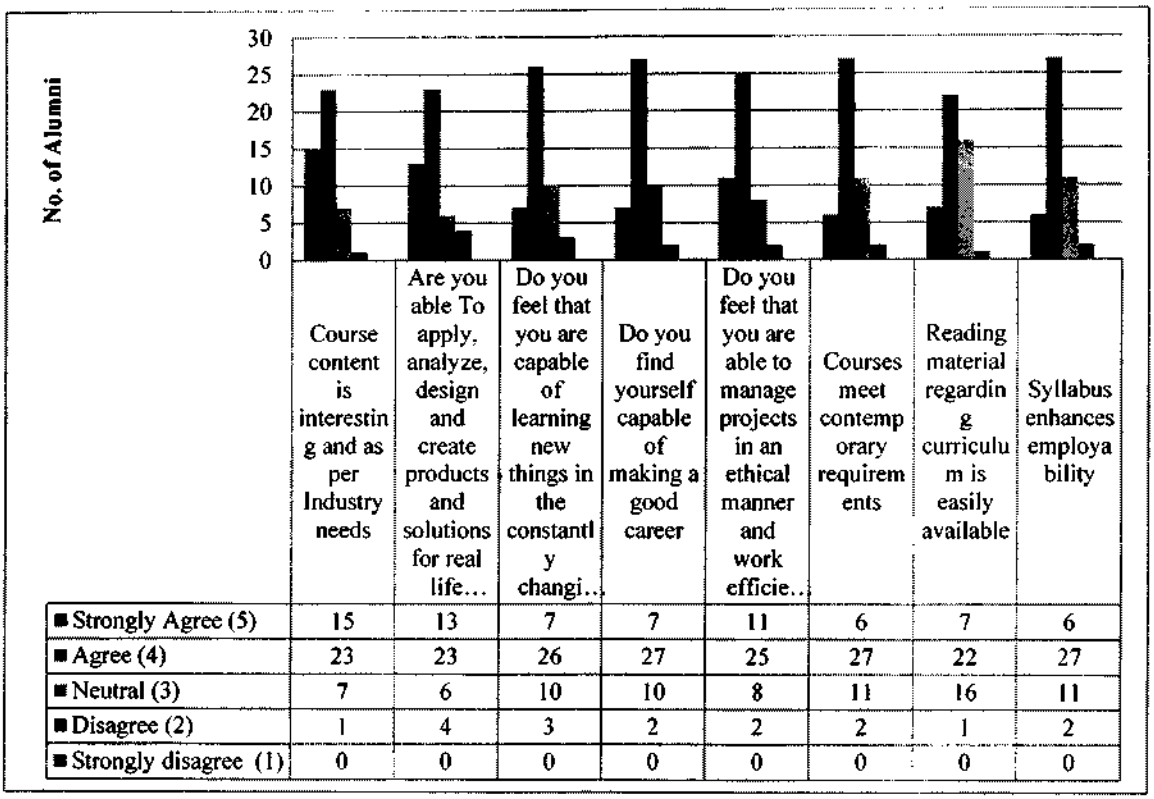
Based on the feedback data received from total 46 Alumni of above mentioned batch following points have been analysed:

- It has been analyzed that 32.61% of students are strongly agreed, 50% of students are agreed, 15.22% of students are neutral, and 2.17% of students are disagreed with Course content which is interesting and as per Industry needs.
- It is found that 28.26 % of students are strongly agreed, 50% of students are agreed, 13.04% of students are neutral, and 8.69% of students are disagreed to apply, analyze, design and create products and solutions for real life engineering problems.

S. No.	Comments	Action Taken	Result
1	Need to more focus on programming using data structure, or split data structure in two parts so it will be beneficial for students to focus more and more.	To inculcate the habit of coding, mini skill project has already incorporated as a part of scheme.	Implemented
2	focus on development section, which is very useful for grab a job in service based companies	Mini skill project and proficiency in subjects enhance the students' power of thinking and coding.	Implemented
3	Try to add course regarding remove nervousness during interviews	Self-study & seminar gives a platform to the student where he can improve himself write communication.	Implemented
4	Small Projects based on domain should be given in every semester, so that students gain knowledge and develop interest	To inculcate the habit of coding, mini skill project has already incorporated as a part of scheme.	Implemented
5	Last 3 semester's subjects were totally from non IT background. Try to teach latest technology instead, so that it will be helpful for placements	According to the recent scenario, and request of so many students to teach at least 2-3 subjects from other discipline so that they can be more versatile.	Proposed for discussion

6	More practical Labs than Theory classes	Try to add practicals where not included, and add more practicals where already included for practice.	Discussed
7	Constant updation of curriculum to be industry ready	Suggestions required from industry. Workshops will be conducted with them and will take meetings from alumni.	Implemented
8	focus more on Al and machine learning	This course has already added in higher semesters.	Implemented
9	Internship and coding please	As a part of curriculum, department offers internships to lower semester students and allow higher semester students to go for internships rather than project. Department placement cell also suggest them good company's for internships.	Implemented
10	Data science problem solving	This course has already added in higher semesters.	Implemented
11	Basic need of understanding of current technology management	Mini skill project and proficiency in subjects enhance the students' power of thinking and coding.	Implemented
12	More technology and companies must be invited for placements	T&P cell and department is trying to contact with many companies continuously.	In progress
13	Include more practical lectures than theoretical ones	Try to add practicals where not included, and add more practicals where already included for practice.	Discussed
14	It should include international courses too like Coursera and edx	Students are free for attend any international courses	Discussed

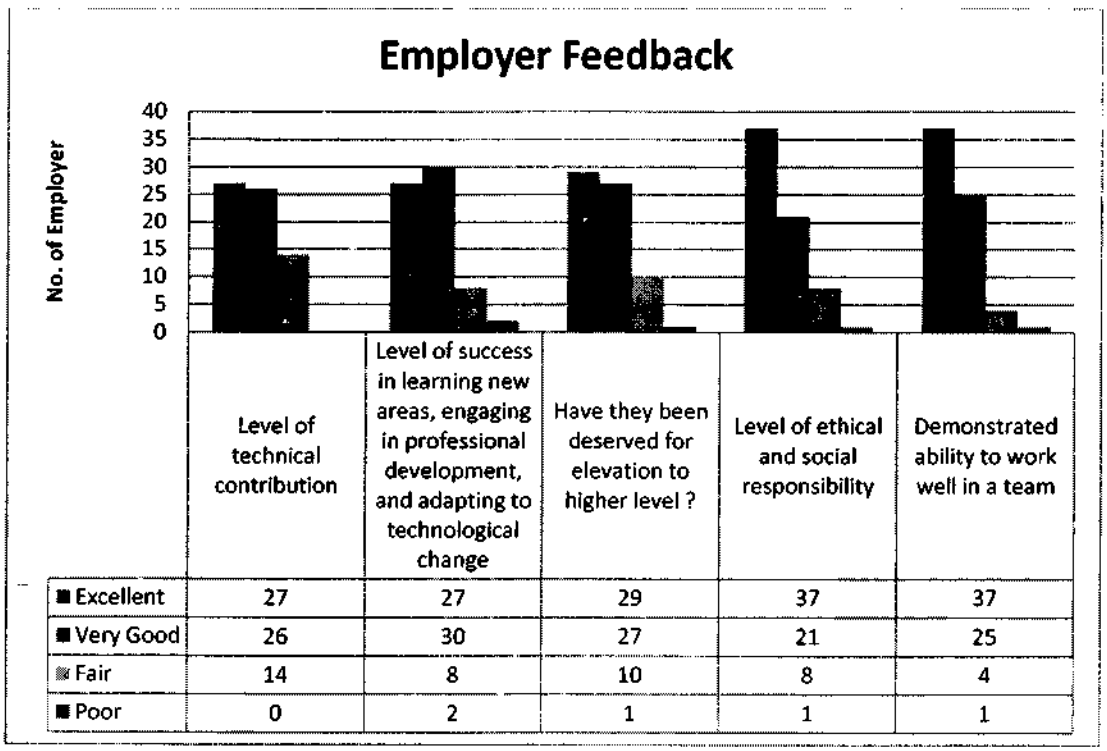
PARAMETERS	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
Course content is interesting and as per Industry needs	15	23	7	1	0
Are you able To apply, analyze, design and create products and solutions for real life Engineering problems	13	23	6	4	0
Do you feel that you are capable of learning new things in the constantly changing technological world?	7	26	10	3	0
Do you find yourself capable of making a good career	7	27	10	2	0
Do you feel that you are able to manage projects in an ethical manner and work efficiently as a member/leader of multidisciplinary teams.	11	25	8	2	0
Courses meet contemporary requirements	6	27	11	2	0
Reading material regarding curriculum is easily available	7	22	16	1	0
Syllabus enhances employability	6	27	11	2	0
Link of the Alumni feedback	https://docs.google.com/spreadsheets/d/1hj_25OhnOoq8xWH9qY6tfzFoGqNZ0btTWTVXMbH4by4/edit?usp=sharing				



	Course content is interesting and as per Industry needs	Are you able To apply, analyze, design and create products and solutions for real life…	Do you feel that you are capable of learning new things in the constantly changi…	Do you find yourself capable of making a good career	Do you feel that you are able to manage projects in an ethical manner and work efficie…	Courses meet contemporary requirements	Reading material regarding curriculum is easily available	Syllabus enhances employability
Strongly Agree (5)	15	13	7	7	11	6	7	6
Agree (4)	23	23	26	27	25	27	22	27
Neutral (3)	7	6	10	10	8	11	16	11
Disagree (2)	1	4	3	2	2	2	1	2
Strongly disagree (1)	0	0	0	0	0	0	0	0

EMPLOYER SATISFACTION SURVEY (2018-2021): Sample Size : 67

Parameter (MITS Student working under you or in your Organization)	Excellent	Very Good	Fair	Poor	Employer Satisfaction Index
Level of technical contribution	27	26	14	0	4.19
Level of success in learning new areas, engaging in professional development, and adapting to technological change	27	30	8	2	4.16
Have they been deserved for elevation to higher level?	29	27	10	1	4.22
Level of ethical and social responsibility	37	21	8	1	4.37
Demonstrated ability to work well in a team	37	25	4	1	4.43
Employer Satisfaction Index (ESI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Fair, 1: Poor)					



Link of Employer Feedback

https://docs.google.com/spreadsheets/d/10Ij8MtXBQSdv8H2bmHfxVIOvQM3qTL3q/edit?usp=sharing&ouid=109055627337813693303&rtpof=true&sd=true

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XVII

Course Outcomes (COs) feedback Analysis and Impact Report for July – December 2021 Semester (Information Technology/ Internet of Things (IoT)/ Artificial Intelligence and Robotics/ Artificial Intelligence & Data Science/ Artificial Intelligence & Machine Learning)

[ITEM IT - 22]

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DEPARTMENT OF INFORMATION TECHNOLOGY

Analysis and Impact Report of Course Outcomes (COs) feedback

On the basis of analyzed data following issues are addressed

1. Target level must be increased for each subject of curriculum.
2. High order thinking question must be incorporated in question paper.
3. Design the questions in the exam papers for enhancement of more CO's coverage.

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DEPARTMENT OF INFORMATION TECHNOLOGY

ANNEXURE - XVIII

Modules/Courses Offered By Department of Information Technology Under Summer Internship Project – I (SIP-I)/ Novel Engaging Course (NEC)/ Skill Enhancement Program (SEP) (Under Flexible Curriculum)

[ITEM IT -23]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

SUMMER INTERNSHIP PROJECT – I (SIP-I) MODULES

Name of the Module	**Programming using Python**
Name of Module Coordinator	Prof. Abhishek Dixit, Dr. Saumil Maheshwari
Email and contact details of Module Coordinator	abhishekdixit@mitsgwalior.in (7000480998) saumil@mitsgwalior.in (9827352520)
Objectives	The Summer Internship course is designed to provide basic knowledge of Python. Python programming is intended for students who want to learn core Python scripting elements such as variables and flow control structures. Discover how to work with lists and sequence data. Write Python functions to facilitate code reuse.
Content	Introduction to Python, Setting Up Programming Environment, Variables and Simple Data Types: Strings, Numbers, User Input, Control Structures: Selection Control, Iterative Control, Introduction to Lists and Tuples, Iterating Over Lists, Dictionaries and Sets, Functions, Recursion, Data Visualization.
Mode of Delivery (online/offline/Blended)	Online
Outcomes	Student will be able to: 1. define basic syntax and features of python programming language. 2. apply various python programming concept to solve the problem. 3. design and implement python applications.
Drive link of Module information video (1- 2 min)	https://drive.google.com/file/d/1FDMUMGjvya2IMXwHaOXKWHI5Kaumjz RJ/view?usp=sharing

Name of the Module	**Imbalanced Learning for classification**
Name of Module Coordinator	Dr. Bhagat Singh Raghuwanshi
Email and contact details of Module Coordinator	bhagat@mitsgwalior.in
Objectives	The course will give the student the basic ideas and intuition behind modern imbalance learning approaches. To learn, various imbalance machine learning approaches
Content	• Machine Learning • Linear regression • Logistic regression • Underfitting vs overfitting • Evaluation matrix such as accuracy, recall, precision, Roc • Cross-validation techniques • Extreme learning machine • Imbalance Learning • Weighted Extreme learning machine
Mode of Delivery (online/offline/Blended)	Online
Outcomes	Student will be able to: 1. apply imbalance learning approaches for classify samples. 2. understand the Implementation of imbalance learning methods 3. apply various imbalance supervised leaning and unsupervised leaning methods.
Drive link of Module information video (1-2 min)	https://drive.google.com/drive/folders/1JbVxIt-oJa4eUwFeye-0iP4rs2CRket1

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DEPARTMENT OF INFORMATION TECHNOLOGY

Name of the Module	**Problem Solving through programming**
Name of Module Coordinator	Dr. Dhananjay Bisen
Email and contact details of Module Coordinator	dhananjay@mitsgwalior.in 9993331506
Objectives	The objective of course is aimed at facilitating the students to: 1. Formulate arithmetic and logical problems into algorithms and translate algorithms to computer programs using concept of C, CPP and python language. 2. Decompose problems into functions and synthesize a complete program using divide and conquer approach. 3. Apply programming to solve matrix addition and multiplication problems and searching and sorting problems as well as solve simple numerical method problems.
Content	Introduction to Problem Solving through programs, Flowcharts, Pseudo codes and Algorithms. Introduction of C, CPP and Python programming, Variables and Data Types, operators, array, functions and Recursion. Programming solution for arithmetic and logical problems, Divide and conquer problem, Matrix calculation problem, searching and sorting problems, simple numerical method problems.
Mode of Delivery (online/offline/Blended)	Online
Outcomes	Student will be able to: 1. learn about programming concepts to solve arithmetic and logical problems. 2. understand basics need of C, CPP and Python programming language. 3. apply programming to solve matrix problems and searching and sorting problems. 4. solve problems using divide and conquer approach.
Drive link of Module information video (1-2 min)	https://drive.google.com/drive/folders/1bHS6GXVPJyv7i5dRHIZ0mrHSwmqCA2lj?usp=sharing

Name of the Module	**JAVA (Core)**
Name of Module Coordinator	Dr. Vikram Rajpoot Prof. Namrata Agrawal
Email and contact details of Module Coordinator	vikramraj@mits gwalior.in 7999622309
Objectives	To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc and acquire the ability to write a computer program to solve specified problems.
Content	Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions.Packages, Package access, Variables and datatypes, Conditional and looping constructs, Arrays, Fields and Methods,Constructors, Overloading methods, Nested classes, Overriding methods,Polymorphism, Making methods and classes final, Wrapper classes,Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA, Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.
Mode of Delivery (online/offline/Blended)	Blended
Outcomes	Student will be able to:

	1. tell the available features in Java programming language. 2. illustrate Java programming concepts for solving problems. 3. make use of the Java programming methods for connecting the various databases. 4. test for bugs in a software application written in the Java programming language.
Drive link of Module information video (1- 2 min)	https://drive.google.com/file/d/1vdPLAcRSTpM7YlYti7Vt1tLmh7HMRVEx/view?usp=sharing

Name of the Module	**Data Handling Through MATLAB programming**
Name of Module Coordinator	Dr. Pawan Dubey Dr. Tej Singh
Email and contact details of Module Coordinator	pawand@mitsgwalior.in tejs@mitsgwalior.in 9390639516, 9560402578
Objectives	Data visualization through MATLAB
Content	To deal with large amount of data and its analysis. MATLAB provides simple programming platform for engineers and researchers. Now a days, data is a gold. Thus, this SIP Module will enable students to understand data manipulation and visualization techniques through MATLAB programming language.
Mode of Delivery (online/offline/Blended)	Blended
Outcomes	Students will be able to understand fundamentals of research language.
Drive link of Module information video (1-2 min)	https://drive.google.com/drive/folders/11jLUTnxmqHmw725ErGAYUDko5DbRNvhG?usp=sharing

Name of Module	**Scientific writing Tools**
Name of Module Coordinator	Dr. Nidhi Saxena
Email and Contact Details Module Coordinator	nidhisaxena@mitsgwalior.in 9340663557
Objectives	Writing of technical journal articles, technical reports, thesis, books, and slide presentations using LaTeXand supporting software
Content	• Control over large documents containing sectioning, cross-references, tables and figures. • Typesetting of complex mathematical formulae. • Advanced typesetting of mathematics with LaTeX. • Automatic generation of table of contents, bibliographies and indexes.
Mode of Delivery (Online/Offline/Blended)	Offline
Outcomes	This course provide a comprehensive theoretical foundation and hands on practice with LaTeX and supporting software for preparing project reports, research articles, theses and presentations. Especially it will be useful for beginners in documentation.
Drive link of Module Information Video (1-2 Min)	https://drive.google.com/drive/u/3/folders/12Ys1qj65GCJajRkp597JmzqQ3Vh2WtwM

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DEPARTMENT OF INFORMATION TECHNOLOGY

NOVEL ENGAGING COURSES (NEC)

Name of Faculty Mentor	**Punit Kumar Johari**
Course Name/Code	**Digital Learning (Sem. III - 2000010, Sem. IV-2000011)**
Objectives	1. To understand principles, concepts and issues concerning the use of digital technologies to support learning, and apply these in their own practice 2. To understand the effect of Computer Based Information Systems (CBIS) on an organization 3. To acquire sufficient IT skills and knowledge to appreciate (evaluate) a CBIS
Content	**Semester 3:** Introduction to Spreadsheet Modelling, Presentation of Quantitative Data, Analysis of Quantitative Data, Presentation of Qualitative Data, Analysis of Qualitative Data, Inferential Statistical Analysis of Data.
	Semester 4: Advance Data Analysis: Modelling and Simulation, Solver, Scenarios, and Goal Seek Tools, Data Visualization Tools and Techniques like Excel, Tableau etc.
Contact hrs. per semester	30
Outcomes	**Semester 3:** After completion of the course, students will be able to: • Analyse a range of locally available digital technologies • Explore digital technologies that can be used to support analytical learning. • Participate in an organization's information systems and technology decision-making processes. • Identify ways information systems & technology may improve an organization's performance, including improving organizational processes, decision-making, and collaboration.
	Semester 4: After completion of the course, students will be able to: • Use computer-based information systems and technologies to solve business problems. • Analyze business scenarios and make recommendations regarding the strategic use of IT. • Demonstrate competency in using tools, techniques, methodologies, and practices of various forms of the systems development life cycle. • Apply MIS knowledge sets, skills, and tools to a real-world complex problem

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DEPARTMENT OF INFORMATION TECHNOLOGY

Name of Faculty Mentor	**Abhishek Dixit**
Novel Engaging Course Title	**IT Tools (2000089)**
Objectives of Course	To learn different components of the Excel worksheet and PowerPoint. To understand the features of interactive online platforms.
Content	**Excel:** Getting Started with Excel, Working with Formulas and Functions, Creating Charts and Graphics, Use Advanced Excel Features, Analyzing Data With Excel. **PowerPoint:** Creating Presentation, Setting Backgrounds, Editing Presentation, Formatting Presentation, Insert Slide Numbers, Header & Footer, Working with Multimedia, Sharing Presentation. **Working with online platforms:** Microsoft 365, Google Services, Google Sheet, Google Docs, Google Slides, Google form. Video and Audio Tools, Documents Scanning Tools, Format Conversion Tools. **Interactive Platforms with their features:** Google Meet, Zoom, Microsoft Team etc.,
Contact hrs	30 hrs
Outcomes of Course	After completion of this course, the students would be able to: 1. Choose various online platforms for preparing worksheet and presentation. 2. Apply various formulas and functions in Excel worksheet. 3. Analyze the data using Excel. 4. Examine the working of various interactive platforms tools. 5. Design Excel worksheet and PowerPoint presentation.

Name of Faculty Mentor	**Saumil Maheshwari**
Novel Engaging Course Title	**Understanding Financial Markets (2000090)**
Objectives of Course	1. To build up the strong portfolio and understand the role of financial market in economy 2. To understand the most important financial markets, that people can invest in and break down their key drivers and attributes.
Content	General introduction and key concepts, Major financial Markets, other financial markets
Contact hrs	30 hrs
Outcomes of Course	.Upon completion of the course, the students will be able to: 1. Describe the different components of a financial system and their role. 2. Explain the recent developments in the Indian financial system 3. Describe the instruments, participants and operation of the money market

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Name of Faculty Mentor	**Pawan Dubey**
Novel Engaging Course Title	**Python for Image processing applications using Open CV (2000096)**
Objectives of Course	1. To understand the Fundamentals Image processing. 2. To understand the python application in Image processing 3. To understand the research implementation aspects in Image processing
Content	**Fundamentals of Python**: What is Programming, Importance and history of Programming. High Level Language, Assembly Language, and Machine Language, How Compiler compiles source code to machine code. Operators and Data type of Python. Lists.S ets and Tuples. Dictionaries. Conditional statements. **Image Processing algorithms:** Image Transforms. Image Enhancement. Spatial Domain: Basic relationship between pixels- Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters. Image Restoration, Feature Extraction, Image Reconstruction from Projections. **Image processing through OpenCV**: Essential software installation, OpenCV Implementation: Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters. Image Restoration, Feature Extraction. **OpenCV IP Application instances**: Image smoothing, finger print classification, Iris classification, Noise Filtering through open. Morphological operations
Contact hrs	30 hrs
Outcomes of Course	Students will be able to: 1. Explain image processing fundamentals. 2. Describe python applications in image processing application. 3. Apply OpenCV and Python for real life application.

Name of Faculty Mentor	**Dr. Dhananjay Bisen**
Course Title	**Statistical data analysis through programming**
Objectives of Course	To develop ability between students that deal with numerical and quantitative issues in real-time data as well as to enable the use of statistical and graphical libraries of programming in data analysis.
Content	Introduction to programming languages, Programming libraries for statistical analysis, numerical computing, complex mathematical computation, data visualization, working with all libraries and packages.
Contact hrs	30 per semester
Mode of Delivery	Online
Outcomes of Course	Students will be able to 1. Learn about programming languages and tools of statistical data analysis. 2. Introduce statistical libraries for working with data sets. 3. Understand the working of programming libraries for data analysis.
External Mentors / Collaborations	Dr. Bhagat Singh Raghuwanshi (Assistant professor, IT deptt., MITS Gwalior)

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Name of Faculty Mentor	**Dr. Bhagat Singh Raghuwanshi**
Novel Engaging Course Title	**Imbalance Learning**
Objectives of Course	• The course will give the student the basic ideas and intuition behind modern imbalance learning methods • To learn, various imbalance machine learning methods • To learn handle the imbalanced classification problems
Content	Unit –I Introduction to Imbalance learning. Unit-II Extreme learning machine, Support Vector Machine, SMOTE methods, Training of feed forward networks by back propagations, Stochastic Gradient Descent. Unit-III Different tool used for imbalance learning Unit-IV Random vector functional link, Least square methods Unit-V Weighted Extreme learning machine, class-spefic extreme learning machnie
Contact hrs	30 hrs
Mode of Delivery	**Online Mode**
Outcomes of Course	Students should able to: 1. apply imbalance classification algorithms for classify data. 2. understand the implementation of imbalance learning Algorithms. 3. apply imbalance learning algorithms for finding relationships between data variables. 4. examine various imbalance supervised leaning and unsupervised leaning techniques and their comparison. 5. build the concept of working of Algorithms for imbalance learning.

Name of Faculty Mentor	**Dr. Tej Singh**
Novel Engaging Course Title	**Integrating Engineering and Literacy**
Objectives of Course	Engaging students in engineering by having them work through Novel Engineering activities and anticipating student responses while planning lessons can focus attention back to the students, and builds in a check to see if the tasks allow for multiple design paths.
Content	Introduction to the theory, curricula and practices of teaching integrated engineering and literacy. Topics include disciplinary engineering practices, connecting literacy to engineering, analysis of example implementations, and literacy practices. Required implementation of sample curricular units in educational settings.
Contact hrs	30 hrs
Mode of Delivery	ONLINE
Outcomes of Course	• This allows participants to experience engineering themselves and reflect on their own understandings of engineering and the engineering design process. • Discussion will focus not only on engineering within Novel Engineering, but engineering as a discipline. • Participants will plan their own activities, with explicit focus on anticipating how their own students may respond. • Topics such as presenting materials to students, student planning, incorporating writing, and supporting students to make functional designs will be included.
External Mentors / Collaborations	NA

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Skill Enhancement Program (SEP) Modules

Module Name	**Google Services**
Module Coordinators	Prof. Vikas Sejwar, Prof. Abhilash Sonkar, Prof. Neha Bhardwaj
Module Objective	Google offers various services that makes daily tasks friendly. It is just like an assistant. Most of the things depend on data, Google help to manage and share data with their various applications.
Module Content	Google drive, calendar, Google classroom and Google cloud services
Module Methodology	The workshop will start with theoretical concept of Google services. Then various hands on session will be conducted on various Google services..
Module Outcome/ Impact	• Understand the need of Google services. • Understand how to use these services to make life easy.
Duration	4 Weeks

Module Name	**Deep Learning – Basics to Advance**
Module Coordinators	**Prof. Punit Kumar Johari**
Module Objective	Deep Learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called artificial neural networks. A function imitates the workings of the human brain in processing data and creating patterns for use in decision-making. Learn Deep Learning, Transfer Learning and Neural Networks using the latest frameworks.
Module Content	An Introduction to Deep Learning, Perceptron: Perceptron implementation using python, Python scripting & modular coding for Perceptron, Python logging basics and docstrings, Python packaging, Github actions, and PyPI. Multilayer Perceptron Forward propagation Why we need Activation function? ANN implementation using tf.keras, ANN with Callbacks | Tensorboard | Early Stopping | Model Checkpointing Vector Differentiation Partial differentiation Maxima and minima concept Gradient descent basics In-depth understanding of Gradient descent Chain rule Back propagation General problems in training Neural Networks Vanishing and Exploding gradients Activation function basics, Weight initialization, Activation functions, Transfer learning, Batch normalization, Deep Learning Advance topics
Module Methodology	The module will start with theoretical concept of Neural Network, Perceptron, Deep Learning concepts, Further, Various hands-on session is scheduled on various freeware software used in Deep Learning such as: Python, keras, anaconda, Numpy, Tensorboard etc.
Module Outcome/ Impact	Understand the basic concepts of ANN, Deep Learning. Identify the deep learning algorithms, which are more appropriate for various types of learning tasks in various domains. Implement deep learning algorithms and solve real-world problems.
Duration	4 Weeks