**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 – 22nd December, 2021)***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## Summary of Board of Studies (BoS)

## Courses where revision was carried out

| (Course/subject name) | Course Code | Year / Date of introduction | Year / Date of revision | Percentage of content added or replaced | Agenda Item No. | Page No. |
|---|---|---|---|---|---|---|
| Compiler Design | 160601 | 2019 | 22/12/2021 | 4.62 | ITEM IT-06 | 04 |
| Computer Networks | 160602/160413 | 2019 | 22/12/2021 | 1.35 | ITEM IT-06/11 | 04/06 |
| Cloud Computing | 160614 | 2019 | 22/12/2021 | 8.30 | ITEM IT-07 | 04 |
| Computer Graphics & Multimedia | 160411 | 2018 | 22/12/2021 | 6.70 | ITEM IT-11 | 06 |
| Digital Logic Design | 230201/240201 | 2020 | 22/12/2021 | 6.25 | ITEM IT-18 | 07 |
| Digital Electronics | 160213 | 2017 | 22/12/2021 | 6.25 | ITEM IT-18 | 07 |

## Courses focusing on employability/entrepreneurship/ skill development

| (Course/subject name) | Course Code | Activities/contents which have a bearing on increasing skill and employability | Agenda Item No. | Page No. |
|---|---|---|---|---|
| Blockchain and its Applications | 160854 | the basic design principles of Blockchain technology and its applications over different sectors. | ITEM IT - 02 | 02 |
| Object Oriented System Development Using UML, Java And Patterns | 160855 | Use of UML to arrive at a design solution, Skeletal java code generation from UML diagrams. These are good solutions to typical programming problems, that can be understood and applied in a specific design situation to improve the overall design and reduce design iterations. | ITEM IT - 02 | 02 |
| Advanced Graph Theory | 160857 | In-depth understanding of Graphs and fundamental principles and models underlying the theory, algorithms, and proof techniques in the field of Graph Theory. Upon completing this course, students will have intimate knowledge about how the graph theory play an important role to solve the technology driven and research oriented problems. | ITEM IT - 02 | 02 |

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

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|---|---|---|---|---|
| Network & Web Security | 160611/230405/240405 | Topics on testing network vulnerabilities, Malware, ransomware, phishing, Advanced Persistent Threats etc. will enable students to become employable for jobs like Cybersecurity Analyst, Penetration Tester, Security Technician, IT Auditor etc. | ITEM IT - 07 | 04 |
| Agile Methodology | 160613 | Students would get the ability to develop and designing agile methodology in different stage. Also know about how to test the software before the final deployment. | ITEM IT - 07 | 04 |
| Data Analytics with Python | 160651 | Student will learn Python Programming with Data Processing, Visualization, Learning Methods and various Classification Methods | ITEM IT - 04 | 03 |
| Introduction to Industry 4.0 and Industrial Internet of Things | IT0622H2 | Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle. | ITEM IT – 05 | 03 |
| Cloud Computing | 160614/230402/240402 | Students can classify different types of computing and compare with cloud computing. They will also able to categorization of software environment and platform for cloud. | ITEM IT - 07 | 04 |
| Design and Thinking Lab | 240406 | Students to learn basic prototyping skills needed to develop modules needed for Industry 4.0 | ITEM IT - 11 | 06 |
| IoT Architecture and Protocols | 230404 | Students would get the ability to develop IoT based application for the users and also establish skill to solve real world problems like IoT based agriculture system, smart home system etc. Now a day it is essential for the job scenario in IT industries. | ITEM IT - 11 | 06 |
| Machine Learning and Optimization | 240404 | Students can use their subject knowledge to develop ability to solve real-time challenges that is important for both data scientists and software engineers and essential for machine learnin g engineers. | ITEM IT - 11 | 06 |
| Python Programming | 160414/ 230406 | 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 - 11 | 06 |
| Cyber Security | 100004 | Students can apply cyber security concept in forensic science to investigate a cybercrime. | ITEM IT - 11 | 06 |

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| Robotics & Vision Control | 900119 | Robots and Artificial Intelligence are integral component of Industry4.0. Robots are transforming the manufacturing process in industrial plants and have become the backbone of production industry. This course will enable students to learn fundamentals of robot and vision based algorithms that may be used to control robot servos. This will enhance their skill to be industry ready in the area of manufacturing and it will enable them to innovate in the field of automation. | ITEM IT - 23 | 08 |
| Robotic Vision and Machine Learning | | In robotic applications, students will gain the knowledge of vision based applications. Since ample of vision based applications are being developed in various companies, there our students will get carrier opportunities by the proposed course. | ITEM IT - 23 | 08 |
| Randomized Algorithms in Machine Learning | | Students will able to get knowledge of Randomized methods in machine leaning, how to handle the Imbalance classification problems etc.. Also know about the how to run the machine learning methods. | ITEM IT - 23 | 08 |
| Fundamentals of Information Retrieval | | Basic concepts and techniques of information retrieval for extracting knowledge from the web. | ITEM IT - 23 | 08 |
| Digital Image Processing for Medical Applications | | The implementation of image processing techniques has had a massive impact on many tech organizations including the medical industry where Digital image processing is extensively used to help medical practitioners enhance their efficiency and productivity. In this course, students will learn basics of Digital image processing in the area of medical imagining that will enable them to pursue research in Biomedical Image processing and innovate new ideas related to healthcare and automation. | ITEM IT - 23 | 08 |
| 5G Technology and IoT | | Students can use the subject knowledge to understand the concept of 5G and IoT applications. Now a days various companies use these technology to develop IoT based applications, so it is beneficial for our students. | ITEM IT - 23 | 08 |

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## New Courses

| (Course/subject name) | Course Code | Activities/contents which have a bearing on increasing skill and employability | Agenda Item No. | Page No. |
|---|---|---|---|---|
| Blockchain and its Applications | 160854 | the basic design principles of Blockchain technology and its applications over different sectors. | ITEM IT - 02 | 02 |
| Object Oriented System Development Using UML, Java And Patterns | 160855 | Use of UML to arrive at a design solution, Skeletal java code generation from UML diagrams. These are good solutions to typical programming problems, that can be understood and applied in a specific design situation to improve the overall design and reduce design iterations. | ITEM IT - 02 | 02 |
| Advanced Graph Theory | 160857 | In-depth understanding of Graphs and fundamental principles and models underlying the theory, algorithms, and proof techniques in the field of Graph Theory. Upon completing this course, students will have intimate knowledge about how the graph theory play an important role to solve the technology driven and research oriented problems. | ITEM IT - 02 | 02 |
| Introduction to Deep Learning | | Practice their skills on many well-known real-life problems and learn deep neural networks for different applications and data types. | ITEM IT - 04 | 03 |
| Data Analytics with Python | 160651 | Student will learn Python Programming with Data Processing, Visualization, Learning Methods and various Classification Methods | ITEM IT - 04 | 03 |
| Online Privacy | IT0822H1 | Online Privacy needs to be investigated, studied and characterized from various perspectives (computational, cultural, psychological, theoretical, etc.). It is critical to understand the threats and defend privacy through real-time and scalable systems. | ITEM IT - 05 | 03 |
| 5G Technology and IoT | | Students can use the subject knowledge to understand the concept of 5G and IoT applications. Now a days various companies use these technology to develop IoT based applications, so it is beneficial for our students. | ITEM IT - 23 | 08 |

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|---|---|---|---|---|
| Digital Image Processing for Medical Applications | | The implementation of image processing techniques has had a massive impact on many tech organizations including the medical industry where Digital image processing is extensively used to help medical practitioners enhance their efficiency and productivity. In this course, students will learn basics of Digital image processing in the area of medical imagining that will enable them to pursue research in Biomedical Image processing and innovate new ideas related to healthcare and automation. | ITEM IT - 23 | 08 |
| Robotics & Vision Control | 900119 | Robots and Artificial Intelligence are integral component of Industry4.0. Robots are transforming the manufacturing process in industrial plants and have become the backbone of production industry. This course will enable students to learn fundamentals of robot and vision based algorithms that may be used to control robot servos. This will enhance their skill to be industry ready in the area of manufacturing and it will enable them to innovate in the field of automation. | ITEM IT - 23 | 08 |
| Robotic Vision and Machine Learning | | In robotic applications, students will gain the knowledge of vision based applications. Since ample of vision based applications are being developed in various companies, there our students will get carrier opportunities by the proposed course. | ITEM IT - 23 | 08 |
| Randomized Algorithms in Machine Learning | | Students will able to get knowledge of Randomized methods in machine leaning, how to handle the Imbalance classification problems etc.. Also know about the how to run the machine learning methods | ITEM IT - 23 | 08 |
| Fundamentals of Information Retrieval | | Basic concepts and techniques of information retrieval for extracting knowledge from the web. | ITEM IT - 23 | 08 |

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## Feedback on Curriculum received from Stakeholders: Analysis & ATR

| Stakeholder | Student | Faculty | Alumni | Employer |
|---|---|---|---|---|
| No. of responses | 169 | 12 | 40 | 29 |
| Link of Analysis | Student CC FB | Faculty CC FB | Alumni FB Link | Employer FB |
| ATR Link | Student CC FB | Faculty CC FB | Alumni FB Link | Employer FB |
| Link showing Excel sheet of Google Form details of stakeholders | Student FB Link 1<br>Student FB Link 2<br>Student FB Link 3 | Faculty FB Link 1<br>Faculty FB Link 2<br>Faculty FB Link 3 | Alumni FB responses | Compiled by T&P Cell |

# 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: 22/12 /2021

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

The Meeting of **Board of Studies (BoS)** in **Information Technology** was held on 22nd December 2021 at 11:30 A.M. onwards **through video conferencing**. During the meeting following were present.

| | | |
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| 1. | Dr. Akhilesh Tiwari, Professor & Head | Chairman |
| 2. | Dr. Surya Prakash<br>Discipline of Computer Science and Engineering, School of Engineering,<br>Indian Institute of Technology Indore<br>Indore-453552, Madhya Pradesh, India | External Member (Academics)<br>***(Nominee of Hon'ble Vice Chancellor RGPV Bhopal)*** |
| 3. | Dr. Deepak Garg, Professor& Head,<br>Department of Computer Science Engineering<br>Bennett University, Greater Noida, Uttar Pradesh | External Member (Academics) |
| 4. | Dr. Dinesh Kumar Vishwakarma, Professor,<br>Department of Information Technology, Delhi Technological University (DTU), Delhi | External Member (Academics) |
| 5. | Mr. Abhinav Mishra, Sr. Director,<br>Persistent System Limited | External Member (Industry) |
| 6. | Dr. Nisha Chaurasia,Assistant Professor,<br>Department of Information Technology,<br>Dr. B.R. Ambedkar National Institute of Technology,<br>Jalandhar (Punjab) | External Member (Alumnus) |
| 7. | Dr. Vivek Tiwari, Departmentof Computer Science Engineering,<br>International Institute of Information Technology,<br>Naya Raipur (IIIT-NR) | Invitee Member (Academics) |
| 8. | Dr. Sanjiv Sharma | Member |
| 9. | Mr. Punit Kumar Johri | Member |
| 10. | Mr. Vikas Sejwar | Member |
| 11. | Mr. Abhilash Sonkar | Member |
| 12. | Mr. Rajeev Kumar Singh | Member |
| 13. | Ms. Neha Bhardwaj | Member |
| 14. | Dr. Saumil Maheshwari | Member |
| 15. | Dr. Vikram Rajpoot | Member |
| 16. | Dr. Dhananjay Bisen | Member |
| 17. | Dr. Tej Singh | Member |
| 18. | Dr. Pawan Dudey | Member |
| 19. | Dr. Yogeshwar Singh | Member |

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| 20. | Mr. Abhishek Dixit | Member |
| 21. | Dr. Bhagat Singh Raghuwansi | Member |

*In addition to above, faculty members under contractual engagement were also present.*

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

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| 1. | Amrit Kaur (0901EC191020) | B. Tech IT Third year |
| 2. | HarshitaVishwakarma (0901IT191026) | B. Tech IT Third year |

**The following deliberation took place in the meeting:**

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| | **The minutes of previous Board of Studies (BoS) meeting held on 10th June 2021 were discussed and confirmed.** |
| ITEM **IT-1** | To propose the scheme structure of VIII Semester with the provision of Two Departmental Electives and One Open Category (OC) Course, to be offered in online mode with credit transfer for the batch admitted in 2018-19.<br><br>**The scheme structure of VIII Semester were discussed, finalized and recommended** with the provision of Two Departmental Electives and One Open Category (OC) Course (to be offered in online mode) with credit transfer. **The same is Annexed as** Annexure-I. |
| ITEM **IT-2** | To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in *online mode under Departmental Elective (DE) category*, with credit transfer in the *VIII Semester* under the flexible curriculum (*Batch admitted in 2018-19)*<br><br>**The list of Departmental Elective (DE) courses to be offered from SWAYAM/NPTEL/MOOC based learning platform/ Institutional MOOC (in online mode) for B.Tech VIII Semester IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail**<br><br>**DE-5 (B. Tech IT):**<br>• Deep Learning (12 Weeks)<br>• Blockchain and its Applications (12 Weeks)<br>• Object Oriented System Development Using UML, Java And Patterns (12 Weeks)<br><br>**DE-6 (B. Tech IT):**<br>• Ethical Hacking (12 Weeks)<br>• Advanced Graph Theory (8 Weeks)<br>• Information Security-5-Secure Systems Engineering (8 Weeks)<br><br>***In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) courses may be kept dynamic and newly emerging courses may be inducted in line with the industrial need and emerging developments (as and when desired).*** |

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| ITEM **IT-3** | To propose the list of courses which the students can opt from SWAYAM/NPTEL/MOOC based Platforms, to be offered in *online mode under* the *Open Category (OC)* Courses, with credit transfer in the *VIII Semester under* the flexible curriculum (*Batch admitted in 2018-19)*<br><br>**The list of *Open Category (OC)* courses to be offered from SWAYAM/NPTEL /MOOC based learning platforms (in online mode) for B. Tech VIII Semester (other than parent discipline) under the flexible curriculum, were discussed and recommended, as per the following detail.**<br><br>**Offered by IT Department**<br>**OC-4:**<br>• Data Science for Engineers<br>• Social Networks<br><br>***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 and availability of the courses on the SWAYAM/NPTEL/MOOC based learning platforms).*** |
| ITEM **IT-4** | To propose the course and syllabi of Institution (MITS) MOOC Courses with credit transfer facilitation in the *VIII Semester (Batch admitted in 2018-19),* along with their Course Outcomes.<br><br>**The course and syllabi of Institution (MITS) MOOC Courses (with credit transfer facilitation) were discussed and finalized, as per the following**<br><br>• **Introduction to Deep Learning**<br>• **Computer Networks**<br>• **Data Analytics with Python**<br><br>**The detailed syllabi along with the Course Outcomes are Annexed as** Annexure-II. |
| ITEM **IT-5** | To propose the list of "Additional Courses" which can be opted for getting an<br>***(i) Honours (for students of the host department)***<br>***(ii) Minor Specialization (for students of other departments)***<br>*[These will be offered through SWAYAM/NPTEL MOOC based Platforms for the* ***VI semester*** *(for the batch admitted in 2019-20) and for* ***VIII semester students*** *(for the batch admitted in 2018-19)]*<br>**B. Tech VI Semester (2019-20 admitted batch)**<br>**Additional Courses for "Honours" (Parent Department)**<br>• GPU Architectures and Programming (12 Weeks)<br>• Introduction To Soft Computing (8 Weeks)<br>• Introduction to Industry 4.0 and Industrial Internet of Things (12 Weeks) |

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| | **Additional Courses for "Minor Specialization" (Other Departments)**<br><br>**Provision of Domain Specific Courses for minor specialization (as available on the SWAYAM/NPTEL platform), as follows:**<br><br>**Domain 1: Programming**<br>• Database Management System (8 Weeks)<br>• Cloud computing (12 Weeks)<br><br>**Domain 2: Systems**<br>• Computer Networks and Internet Protocol (12 Weeks)<br>• Introduction to Database Systems (12 Weeks)<br><br>**B. Tech VIII Semester (2018-19 admitted batch)**<br>**Additional Courses for "Honours" (Parent Department)**<br>• Online Privacy (12 Weeks)<br>• User-centric Computing for Human-Computer Interaction (8 Weeks)<br>• Hardware Security (12 Weeks)<br>**Additional Courses for "Minor Specialization" (Other Departments)**<br>• Foundations of Cryptography (12 Weeks)<br>• Design and Engineering of Computer Systems (8 Weeks)<br>• Introduction to internet of things (12 Weeks)<br><br>In continuation, it is discussed that the above list must be kept dynamic and additional courses may be inducted (as per the requirement). |
| ITEM **IT-6** | To review and finalize the syllabi for all *Departmental Core (DC) Courses* of *VI Semester (for b*atch admitted in 2019-20) under the flexible curriculum along with their COs<br><br>**The Syllabi of all the Departmental Core (DC) Courses, to be offered during VI Semester (B. Tech. IT Programme) along with their COs under flexible curriculum were discussed and recommended. The same is Annexed as** Annexure-III. |
| ITEM **IT-7** | To review and finalize the courses & syllabi to be offered *(for batch admitted in 2019-20 )* under *Departmental Elective (DE) Courses* in the *VI Semester*<br><br>**The courses to be offered under Departmental Elective (DE) category (in offline mode) for B. Tech. VI Semester IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail** |

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| | **DE-1 (B. Tech IT):**<br>• Network & Web Security<br>• Cloud Computing<br>• Agile Methodology<br><br>***It is further discussed that the above mentioned list of courses may be expanded (if required) to accommodate the industrial demand and emerging technological advancements in the field.*** **The syllabi of Courses along with their Course Outcomes (COs) is Annexed as** Annexure-IV. |
| ITEM **IT-8** | To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered *(for batch admitted in 2019-20)* in online mode under *Departmental Elective (DE) Courses* with credit transfer, in the *VI Semester*<br><br>**The list of Departmental Elective (DE) courses to be offered from SWAYAM/NPTEL/MOOC based learning platforms with credit transfer (in online mode) for B. Tech. VI Semester IT discipline (under flexible curriculum) were discussed and recommended, as per the following detail**<br><br>**DE-2 (B. Tech IT):**<br>• Data Analytics with Python<br>• Introduction to Machine Learning<br>• Artificial Intelligence: Knowledge Representation And Reasoning<br><br>***In continuation, it is also discussed and recommended that the above mentioned list of Departmental Elective (DE) courses may be kept dynamic and newly emerging courses must be included (as per the need and recent developments).*** |
| ITEM **IT-9** | To review and finalize the courses & syllabi to be offered *(for batch admitted in 2019-20)* under the *Open Category (OC) Courses* (in traditional mode) for *VI semester* students of other departments along with their COs<br><br>**The courses to be offered under Open Category (OC) Courses for B. Tech. VI Semester (for the students of other departments) were discussed and recommended as per the following detail**<br><br>**Offered by IT Department**<br>**OC-1:**<br>• Software Engineering<br>• Data Mining & Warehousing<br>• Robotics & Vision Control<br><br>***Further, considering the fact that the Open Category (OC) courses are meant only for the students of other departments, it is discussed and recommended that the above list of courses may be expanded (as per the need and demand from*** |

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| | *other departments).* **The detailed syllabi (along with their COs) is Annexed as** Annexure-V. |
| ITEM **IT-10** | To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in VI semester ***(for batch admitted in 2019-20)***<br><br>**The experiment list / lab manual for the Laboratory Courses for VI semester were discussed and finalized. The same is annexed as** Annexure-VI. |
| ITEM **IT-11** | To review and finalize the scheme and syllabi of **B. Tech.** ***IV Semester (for batch admitted in 2020-21)*** under the flexible curriculum along with their COs<br><br>***The Scheme Structure and Syllabi of B. Tech. IV Semester [Information Technology / Internet of Things (IoT) / Information Technology (AI & Robotics)] (for batches admitted in 2020-21) under the flexible curriculum were discussed, finalized and recommended.***<br>***The Scheme Structure & syllabi (along with their COs) is Annexed as*** Annexure-VII. |
| ITEM **IT-12** | To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in IV ***(for batch admitted in 2020-21)***<br><br>**The experiment list / lab manual for the Laboratory Courses for IV semester were discussed and finalized. The same is annexed as** Annexure-VIII. |
| ITEM **IT-13** | To review and finalize the suggestive list of projects which can be assigned under the 'Skill based mini-project' category in various laboratory courses to be offered during Jan. - June 2022 semester, for B.Tech. IV Semester (all disciplines under IT department) ***(for the batch admitted in 2020-21)***.<br><br>**The list of "skill based mini project" for the Laboratory Courses of B. Tech. IV 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-IX. |
| ITEM **IT-14** | To ratify the *Scheme & Syllabi, list of experiments and skill based mini projects of First semester* of the newly started B. Tech. programmes in the emerging areas - Artificial Intelligence & Machine Learning (AI & ML) and Artificial Intelligence & Data Science(AI & DS) (started from 2021-22 Session).<br><br>**The Scheme, Syllabi, List of experiments and Skill based mini projects of B. Tech. I semester (AI & ML, AI & DS) was reviewed and recommended in its present form for further ratification in the Academic Council. The same is annexed as** Annexure-X. |
| ITEM **IT-15** | To ratify the *Scheme & Syllabi, list of experiments and skill based mini projects of First Semester* B. Tech. programmes [admitted batch 2021-22 Session] |

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| | **The Scheme, Syllabi, List of experiments and Skill based mini projects of B. Tech. I semester (IT/ IoT/ AIR) was reviewed and recommended in its present form for further ratification in the Academic Council. The same is annexed as** Annexure-XI. |
| ITEM **IT-16** | To prepare and recommend the *Scheme & Syllabi (along with the Course Outcomes) of II semester* of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS) (started from 2021-22 Session)<br><br>***The Scheme & Syllabi (along with the Course Outcomes) of B. Tech. II semester* [AI & ML, AI & DS] *(batch admitted 2021-22 session), were discussed and recommended.* The Scheme and detailed syllabi along with their COs, annexed as** Annexure-XII |
| ITEM **IT-17** | To prepare and recommend the list of experiments and skill based mini projects of *II semester* of the newly started B. Tech. programmes in the emerging areas (AI & ML, AI & DS) (started from 2021-22 Session)<br><br>**The list of experiments and skill based mini projects for B. Tech II semester (AI & ML, AI & DS) were discussed and recommended. The same is annexed as** Annexure-XIII |
| ITEM **IT-18** | To review and finalize the *Scheme & Syllabi (along with the Course Outcomes) of II semester* B. Tech. programmes (batch admitted 2021-22 Session)<br><br>***The Scheme & Syllabi (along with the Course Outcomes) of B. Tech. II semester* [IT/IoT/AIR] *(batch admitted 2021-22 session), were discussed and recommended.* The Scheme and detailed syllabi along with their COs, annexed as** Annexure-XIV |
| ITEM **IT-19** | To review and finalize the *list of experiments and skill based mini projects of II semester* B. Tech. programmes (batch admitted 2021-22 Session)<br><br>**The list of experiments and skill based mini projects for B. Tech II semester [IT/IoT/AIR] were discussed, finalized and recommended. The same is annexed as** Annexure-XV |
| ITEM **IT-20** | 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 April–September 2021 Semester (ii) January-June 2021 Session for II to IV year students<br><br>**The attainment level of Course Outcomes (COs) for all the courses pertaining to January - June 2021 Session for II to IV Year and April – September 2021 Semester for I Year was presented. In continuation, it is discussed that the courses (if any) where the set target value has not been attained, should be critically analyzed to identify the difficulty level and other causes. The analysis must be followed by corrective measures, such as arrangement of** |

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| | **extra / remedial classes, proper coverage of COs in the Question Paper and interaction with the students for possible improvement.**<br>**The same is annexed as** Annexure-XVI |
| ITEM **IT-21** | To review curricula feedback from various stakeholders, its analysis and impact<br><br>**The summarized report of curricula feedback from various stakeholders (students, faculty members and alumni etc.) for January - June 2021 Semester, II to IV Year and April – September 2021 Semester for I Year was presented and discussed. This was based on various considered parameters. The same is annexed as** Annexure-XVII |
| ITEM **IT-22** | To review Course Outcomes (COs) feedback of various courses, its analysis and impact<br><br>**The detailed analysis and impact report of Course Outcomes (COs) feedback of various courses from students (April – September 2021 Semester, I Year and January - June 2021 Semester for II to IV year) was presented and discussed. The same is enclosed as** Annexure -XVIII |
| ITEM **IT-23** | **Any other matter**:<br>To propose the course and syllabi of newly proposed courses, to be run under various Departmental Electives (DEs) / Open Category (OC) courses (for the batch 2019-20 onwards), along with their Course Outcomes.<br><br>**The list of new courses, as per the following were discussed, finalized and recommended. In the near future, MOOCs development may also be initiated for all these courses or some selected courses.**<br>• **5G Technology and IoT**<br>• **Digital Image Processing for Medical Applications**<br>• **Robotics & Vision Control**<br>• **Robotic Vision and Machine Learning**<br>• **Randomized Algorithms in Machine Learning**<br>• **Fundamentals of Information Retrieval**<br>**The syllabus of above courses, is Annexed as** Annexure- XIX |

**Suggestions by External Experts / Members:**

- Industry expert suggested that the courses related to new technologies such as DevOps, Interoperability, Automation, React.js etc. to be offered in the curriculum.
- It was suggested to remove the keyword "course" from Novel Engaging Courses and further suggested to replace it with practices etc. in the scheme.
- It was also suggested to include the prerequisite in the newly introduced courses to be offered as Departmental Elective and Open Category Courses.

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

Mr. Vishwas Srivastava | Ms. Namrata Agrawal | Dr. Bhagat Singh Raghuwanshi | Mr. Abhishek Dixit

Dr. Yogeshwar Singh | Dr. Pawan Dudey | Dr. Tej Singh | Dr. Dhananjay Bisen

Dr. Vikram Rajpoot | Dr. Saumil Maheshwari | Ms. Neha Bhardwaj | Mr. Rajeev Kumar Singh

Mr. Abhilash Sonkar | Mr. Vikas Sejwar | Mr. Punit Kumar Johri | Dr. Sanjiv Sharma

Online Present

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)

Online Present

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

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

**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR**

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

# *Course Finalized after Review and Post BoS Meeting Discussion Offered in Minor Specialization for Jan.-June 2022 semester (effective for B. Tech VI semester) 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**

## For batch admitted in Academic Session 2019-20

# COURSE

## *(Through SWAYAM/NPTEL)*

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - I**

***Scheme***

***of***

***B. Tech VIII Semester***

***(Batch Admitted in 2018-19)***

***(Information Technology)***

***Under Flexible Curriculum***

***[ITEM IT -1]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## GROUP A: I Semester

## B.Tech. I Semester (Information Technology) *(for batch admitted in Academic Session 2018-19)*

| 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**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## Group A: II Semester

## B.Tech. II Semester (Information Technology) *(for batch admitted in Academic Session 2018-19)*

| 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)

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B.Tech. III Semester (Information Technology)

***(for batch admitted in Academic Session 2018-19)***

| 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**)**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B.Tech. IV Semester (Information Technology)

***(for batch admitted in Academic Session 2018-19)***

| 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**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B.Tech. V Semester (Information Technology)

***(for batch admitted in Academic Session 2018-19)***

| 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/ Assisgnment | 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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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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

| **Honours*** *(to be opted by students of Parent Department)* | **Minor Specialization*** *(to be opted by students of Other Department)* |
|---|---|
| Introduction to Internet of Things | Introduction to Operating Systems |
| Data Science for Engineers | Database Management System |
| The Joy of Computing using Python | Object Oriented Analysis and Design |

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B.Tech. VI Semester (Information Technology)

***(for batch admitted in Academic Session 2018-19)***

| 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/ Assignment | End Sem. | Lab work & Sessional | Assignment | 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 | 2 | 1 | - | 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** | **19** | **2** | **6** | **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 |

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

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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

| **Honours*** *(to be opted by students of Parent Department)* | **Minor Specialization*** *(to be opted by students of Other Department)* |
|---|---|
| GPU Architectures and Programming | Design and analysis of algorithms |
| Privacy and Security in Online Social Media | Programming, Data Structures And Algorithms Using Python |
| Introduction to Industry 4.0 and Industrial Internet of Things | Programming in Java |

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B. Tech. VII Semester (Information Technology) *(for batch admitted in Academic Session 2018-19)*

| 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 | 2 | - | - | 2 |
| 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 | 12 | 1 | 8 | 17 |
| 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 |
| 2. | 160754 | Social Networks |
| 3. | 160755 | Reinforcement Learning |

| OC-2 | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1. | 900208 | Soft Computing |
| 2. | 900209 | Network Security |

| OC-3 | | |
|---|---|---|
| S. No. | Subject Code | Subject Name |
| 1. | 900220 | R Programming |
| 2. | 900222 | Computer Networks |

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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

| **Honours*** *(to be opted by students of Parent Department)* | **Minor Specialization*** *(to be opted by students of Other Department)* |
|---|---|
| Computer Vision | Introduction to Machine Learning |
| Big Data Computing | Cloud computing |
| Distributed Systems | Big Data Computing |

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## B. Tech. VIII Semester (Information Technology)

***(for batch admitted in Academic Session 2018-19)***

| 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. | Term Work Lab Work & Sessional | Assignment | Exam | | L | T | P | |
| 1. | DE | DE | Departmental Elective* (DE-5) | - | - | - | - | - | 25 | 75 | 100 | 4 | - | - | 4 |
| 2. | DE | DE | Departmental Elective * (DE-6) | - | - | - | - | - | 25 | 75 | 100 | 3 | - | - | 3 |
| 3. | OC | OC | Open Category* (OC-4) | - | - | - | - | - | 25 | 75 | 100 | 2 | - | - | 2 |
| 4. | 160801 | DLC | Internship/Project (DLC-9) | - | - | - | 250 | 150 | - | - | 400 | - | - | 6 | 3 |
| 5. | 160802 | - | Professional Development # | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 |
| **Total** | | | | **-** | **-** | **-** | **250** | **200** | **75** | **225** | **750** | **9** | **-** | **8** | **13** |
| **Additional Course for Honours or minor Specialization** | | | | **Permitted to opt for maximum two additional courses for the award of Honours or Minor specialization** | | | | | | | | | | | |

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

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

**DE -5***

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1. | 160853 | Deep Learning (12 Weeks) |
| 2. | 160854 | Blockchain and its Applications (12 Weeks) |
| 3. | 160855 | Object Oriented System Development Using UML, Java And Patterns (12 Weeks) |

**DE-6***

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1. | 160856 | Ethical Hacking (12 Weeks) |
| 2. | 160857 | Advanced Graph Theory (8 Weeks) |
| 3. | 160858 | Information Security-5-Secure Systems Engineering (8 Weeks) |

**OC-4***

| S. No. | Subject Code | Subject Name |
|---|---|---|
| 1. | 900620 | Data Science for Engineers (8 Weeks) |
| 2. | 900621 | Social Networks (12 Weeks) |

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

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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

| Code | Honours*<br>*(to be opted by students of Parent Department)* | Code | Minor Specialization*<br>*(to be opted by students of Other Department)* |
|---|---|---|---|
| IT0821H1 | User-centric Computing for Human-Computer Interaction (8 Weeks) | IT0821M1 | Foundations of Cryptography (12 Weeks) |
| IT0822H1 | Online Privacy (12 Weeks) | IT0822M1 | Design and Engineering of Computer Systems (8 Weeks) |
| IT0822H2 | Hardware Security (12 Weeks) | IT0822M2 | Introduction to internet of things (12 Weeks) |

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

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - II**

# *Syllabi of Institution (MITS) MOOC Courses*

**[ITEM IT – 4]**

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO DEEP LEARNING

**Prerequisites:** Programming, Statistics, Linear Algebra.

## COURSE OBJECTIVES

- To understand the fundamentals of deep learning.
- To practice their skills on many well-known real-life problems.
- To learn deep neural networks for different applications and data types.

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## Week wise Topic distribution

| Week | Topics |
|---|---|
| Week 1 | Introduction: History, AI vs ML vs DL, Deep Learning and its Applications, Machine Learning: Features, Weights, Loss Function, Multilayer Perceptron, Forward Propagation; Model Training: Backpropagation, Stochastic Gradient Descent and Optimizers: Momentum, RMSProp, Adam; Deep Learning Experiments: Datasets, Training-Validation- Testing Set, Evaluation Measures: Accuracy, Precision, Recall, F-Measure. |
| Week 2 | Machine Learning Revisit: Supervised vs Unsupervised Learning, Regression vs Classification Problems, Formulation of Design Problems as Mathematical Programming Problems, Linear Regression, Multiple Linear Regression, Logistic Regression, K-Nearest Neighbour Classification. |
| Week 3 | Tree Based Methods: Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Random Forest, Issues in Decision Tree Learning. Naïve Bayes Classifier, Support Vector Machines. |
| Week 4 | Model Improvement: Overfitting vs Underfitting, Bias vs Variance, Hyper Parameter Tuning: Random, Regularization: L1, L2 Regularization, Dropout, Early Stopping, Data Normalization, Augmentation. |
| Week 5 | Recurrent Neural Networks: Time-Series Data Analysis, Forward Propagation, Backpropagation Through Time (BPTT), Word Embedding, Vanishing-Exploding Gradients. |
| Week 6 | LSTM, GRU; RNN Application: Sentiment Analysis, Text Generation, Image Captioning, Machine Translation, Attention Model. |
| Week 7 | Convolutional Neural Networks: Convolution, Striding, Padding, Pooling, 1x1 Convolution, Famous CNN Models, Generative Adversarial Neural Networks |
| Week 8 | CNN Applications: Transfer Learning, Image Classification, Face Detection, Object Detection, Face/Instance Recognition. |

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## RECOMMENDED BOOKS


- Algorithms for optimization, Mykel and Tim, The MIT Press.
- Francois Chollet, Deep Learning with Python (1 st ed.), Manning Publications Company, 2017. ISBN 978-1617294433.
- Charu C. Aggarwal, Neural Networks and Deep Learning (1 st ed.), Springer International Publishing AG, part of Springer Nature, 2018. ISBN 978-3319944623.
- Machine Learning (1st ed.), T. M. Mitchell, McGraw Hill, 2017. ISBN 978-1259096952.


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## COURSE OUTCOMES

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

CO1. understand the fundamentals of deep learning based on linear algebra, probability, statistics and machine learning

CO2. design Supervised and Unsupervised Learning approaches for real-life problems.

CO3. build, train, test and evaluate the deep learning models

CO4. learn how to improve the deep learning model performance using error analysis, regularization, hyper parameter tuning.

CO5. applying Deep Learning techniques to solve various real life problems.

CO6. handle the time series data with various machine learning models.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER NETWORKS

**Prerequisites:** No Prerequisites

## COURSE OBJECTIVES

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

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## Week wise Topic distribution

| Week | Topics |
|---|---|
| Week 1 | Introduction to Computer Network, Types- LAN,MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fibre, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time. |
| Week 2 | Network Standardization- OSI Reference Model & TCP/IP Protocol Suite.<br>Network topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, |
| Week 3 | Switching- Circuit Switching, Message Switching & Packet Switching<br>Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing. |
| Week 4 | 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. |
| Week 5 | MAC Sub Layer- Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5. |
| Week 6 | Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm |

Week 7 Flooding, Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Week 8 Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression-Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

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**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.

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## COURSE OUTCOMES

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

CO1. understand the fundamental concepts of computer networks.

CO2. illustrate the basic terminologies of computer network and related protocols.

CO3. develop a concept for understanding networking at various layers.

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

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

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

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA ANALYTICS WITH PYTHON

**Prerequisites:** Basics of Programming and Statistics.

## COURSE OBJECTIVES

- To learn how to analyze data using Python.
- To study the basics of Python to explore many different types of data.
- To learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations, predict future trends from data.

---

**Week wise Topic distribution**

| Weeks | Topics |
|---|---|
| Week 1 | Importing Datasets: Datasets, Libraries in Python, Import Data, Exploring and Analyzing the Imported Dataset. |
| Week 2 | Data Wrangling: Fundamental of Data Wrangling, Pre-Processing Phase of Data Analysis- include Handling Missing Values in Data |
| Week 3 | Formatting Data, Normalizing Data, Grouping Data Values into Bins, Converting Categorical Variables into Numerical Quantitative Variables. |
| Week 4 | Exploratory Data Analysis: Calculate Descriptive Statistical Information Such as Mean, Median, Mode, and Quartile Values. |
| Week 5 | Data Groping and Visualization, Model Development: Explanatory Variable and Response Variable, Linear Regression, |
| Week 6 | Multiple Linear Regression Models, Evaluate Model using Visualization, Polynomial Regression and Pipelines, |
| Week 7 | R-Squared and Mean Square Error Measures, Prediction and Decision Making, Model Evaluation: Importance, Data Model Refinement Techniques, |
| Week 8 | Model Selection, Overfitting and Underfitting in Predictive Model. |

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**RECOMMENDED BOOKS**

- Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2 nd Edition by William McKinney.
- Python Data Science Handbook: Essential Tools for Working with Data by Jake VanderPlas.

- Python Data Analytics With Pandas, NumPy and Matplotlib by Fabio Nelli.
- Data Analytics Using Python First Edition by Bharti Motwani

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**COURSE OUTCOMES**

After completion of the course students would be able to:

CO1. describe datasets and libraries used for importing data in python.

CO2. apply some fundamental data wrangling tasks that, together, form the pre-processing phase of data analysis.

CO3. analyze and visualize exploratory data.

CO4. compare basic descriptive statistical information, such as mean, median, mode, and quartile values.

CO5. evaluate R-squared and the mean square error measures to perform in-sample evaluations.

CO6. develop linear regression, multiple linear regression models.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## GROUP A: I Semester *For batch admitted in Academic Session 2019-20*

## B.Tech. I Semester (Information Technology)

| 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**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

## Group A: II Semester *For batch admitted in Academic Session 2019-20*

## B.Tech. II Semester (Information Technology)

| 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**)**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## 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**)**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## 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**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## 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/ Assisgnment | 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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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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

| **Honours*** *(to be opted by students of Parent Department)* |
|---|
| Introduction to Internet of Things |
| Data Science for Engineers |
| The Joy of Computing using Python |

## DOMAIN SPECIFIC COURSES FOR MINOR SPECIALIZATION

| **Domain 1: Programming*** |
|---|
| **Course Name** |
| Programming, Data Structures and Algorithms in Python |
| Programming in Java |

| **Domain 2: Systems*** |
|---|
| **Course Name** |
| Operating System Fundamentals |
| Introduction to Internet of Things |

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## 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/ Assignment | End Sem. | Lab work & Sessional | Assignment | 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** | **1** | **6** | **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**

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## 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) |
| IT0622H2 | 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 (12 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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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - III**

# *Syllabi of*
# *Departmental Core (DC) Courses*
# *B. Tech VI Semester*
# *(Batch Admitted in 2019-20)*
# *(Information Technology)*
# *Under Flexible Curriculum*

***[ITEM IT - 6]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPILER DESIGN
## 160601 (DC-12)

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | 2 | 4 |

## COURSE OBJECTIVES

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

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**Unit-I**

**Overview of Translation Process:** Introduction to Compiler, Translator, Interpreter and Assembler, Overview and use of Linker and Loader, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

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

**Unit-V**

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

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**RECOMMENDED BOOKS**

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

---

## COURSE OUTCOMES

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

**CO1.** define the concepts of finite automata and context free grammar.

**CO2.** build the concept of working of compiler.

**CO3.** examine various parsing techniques and their comparison.

**CO4.** compare various code generation and code optimization techniques.

**CO5.** analyze different tools and techniques for designing a compiler.

**CO6.** design various phases of compiler.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER NETWORKS
## 160602 (DC-13)

| L | T | P | Total Credits |
|---|---|---|---|
| 4 | - | - | 4 |

## COURSE OBJECTIVES

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

---

**Unit-I**

**Introduction:** Computer Network, Types- LAN,MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode, X.25.

**Unit-II**

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

**Unit-III**

**Data Link Layer:** Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

**Unit-IV**

**Network Layer & Transport Layer:** Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

**Unit-V**

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

---

**RECOMMENDED BOOKS**


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


---

## COURSE OUTCOMES

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

**CO1.** explain the fundamental concepts of computer network.

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

**ANNEXURE - IV**

# *Syllabi*
# *of*
# *Departmental Elective (DE-1) Courses*
## *B. Tech VI Semester*
## *(Batch Admitted in 2019-20)*
## *(Information Technology)*
## *Under Flexible Curriculum*
*[ITEM IT -7]*

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## NETWORK & WEB SECURITY
## 160611 (DE-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 4 | - | - | 4 |

## COURSE OBJECTIVES

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

---

**Unit-I**

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

**Unit-II**

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

**Unit-III**

**Hash Functions:** Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

**Unit -IV**

**IP & Web Security Overview:** SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system):

Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Polices.

**Unit -V**

**Phishing:** Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

---

**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.
CO2. illustrate fundamentals of number theory, attacks and security principles.
CO3. apply number theory and various algorithms to achieve principles of security.
CO4. analyze the cause for various existing network attacks and describe the working of available security controls.
CO5. examine the vulnerabilities in IT infrastructure.
CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## AGILE METHODOLOGY
## 160613 (DE-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 4 | - | - | 4 |

**COURSE OBJECTIVES**

- To understand the background and driving forces for taking an agile approach to software development.
- To understand the business value of adopting agile approaches.
- To understand the agile development practices.

---

**Unit -I**

**Fundamentals of Agile:** The Genesis of Agile, Introduction and Background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven Development, Lean Software, Development, Agile Project Management, Design and Development Practices in Agile Projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

**Unit- II**

**Agile Scrum Framework:** Introduction to Scrum, Project Phases, Agile Estimation, Planning Game, Product Backlog, Sprint Backlog, Iteration Planning, User Story Definition, Characteristics and Content of User Stories, Acceptance Tests and Verifying Stories, Project Velocity, Burn Down Chart, Sprint Planning and Retrospective, Daily Scrum, Scrum Roles – Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

**Unit- III**

**Agile Testing:** Agile Lifecycle and its Impact on Testing, Test-Driven Development (TDD), Xunit Framework and Tools for TDD, Testing User Stories - Acceptance Tests and Scenarios, Planning and Managing Testing Cycle, Exploratory Testing, Risk Based Testing, Regression Tests, Test Automation, Tools to Support Agile Tester.

**Unit- IV**

**Agile Software Design and Development:** Agile Design Practices, Role of Design Principles Including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle

in Agile Design, Need and Significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated Build Tools, Version Control.

**Unit -V**

**Industry Trends:** Market scenario and Adoption of Agile, Agile ALM, Roles in Agile Project, Agile applicability, Agile in Distributed Teams, Business Benefits, Challenges in Agile, Risks and Mitigation, Agile Projects on Cloud, Balancing Agility with Discipline, Agile Rapid Development Technologies.

---

**RECOMMENDED BOOKS**


- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.


---

## COURSE OUTCOMES

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

CO1. demonstrate scrum release planning, and scrum sprint planning.

CO2. apply user stories into tasks and ideal day estimates.

CO3. classify a sprint with sprint reviews and sprint retrospectives.

CO4. examine the scrum with multiple team or distributed project teams.

CO5. design test driven and agile principal based software.

CO6. develop any application using agile methodology.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## CLOUD COMPUTING
## 160614 (DE-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 4 | - | - | 4 |

## COURSE OBJECTIVES

- To understand Cloud Computing concepts, technologies, architecture and applications.
- To understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- To understand different cloud programming platforms and tools to develop and deploy applications on cloud.

---

**Unit- I**

**Cloud Architecture and Model:** Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

**Unit- II**

**Virtualization:** Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

**Unit- III**

**Cloud Infrastructure:** Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

**Unit -IV**

**Programming Model:** Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure. ~~Mapping Applications, Programming Support, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.~~

**Unit -V**

**Security in the Cloud:** Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

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## RECOMMENDED BOOKS


- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- John W. Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
- Kumar Saurabh, " Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
- George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
- James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.


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## COURSE OUTCOMES

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

CO1. define various basic concepts related to cloud computing.

CO2. identify the architecture, infrastructure and delivery models of cloud computing.

CO3. apply suitable virtualization concepts.

CO4. choose the appropriate programming models and public cloud platforms.

CO5. analyse various security issues in cloud computing.

CO6. compose virtualization, security and programming modules in cloud computing solutions.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - V**

# *Syllabi*
# *of*
# *Open Category (OC) Courses*
# *B. Tech VI Semester*
# *(Batch Admitted in 2019-20)*
# *(Information Technology)*
# *Under Flexible Curriculum*

***[ITEM IT - 9]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## SOFTWARE ENGINEERING
## 900108 (OC-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

## COURSE OBJECTIVES

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

---

**Unit - I**

**Introduction to Software Engineering:** Definition, Software Engineering-Layered Technology, Software Characteristics and Components, Software Model: Software Development of Life Cycle Model (SDLC), Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection Criteria of Model: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

**Unit - II**

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

**Unit - III**

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

**Unit - IV**

**Software Metrics, Project Management and Estimation:** Metrics in Process and Project Domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project

Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) Based Estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

**Unit - V**

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

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. explain the various fundamental concepts of software engineering.

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

CO3. compare the techniques for software project management & cost estimation.

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

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA MINING & WAREHOUSING
## 900116 (OC-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

## COURSE OBJECTIVES

- To understand the significance of data mining in real-world perspective.
- To gain understanding of data mining techniques, algorithms and commonly used tools.
- To develop ability for applying data mining techniques and tools for solving real-world problems.

---

**Unit - I**

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

**Unit - II**

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

**Unit - III**

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

**Unit - IV**

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

**Unit - V**

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

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. explain various data mining tasks.

CO2. classify various databases systems and data models / schemas of data warehouse.

CO3. compare various methods for storing & retrieving data from different data sources/repository.

CO4. apply pre-processing techniques for construction of data warehouse.

CO5. analyze data for knowledge discovery & prediction using appropriate algorithms.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## ROBOTICS & VISION CONTROL
## 900119 (OC-1)

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

**Prerequisites:** Basics of Linear Algebra and Mechanics.

## COURSE OBJECTIVES

- To learn the fundamentals of Computer Vision framework.
- To lean Digital Image Processing techniques.
- To understand Camera optical system.

---

**Unit-I**

**Computer Vision:** Introduction, Human Eye and Camera, Vision as an Information Processing Task, Homogeneous Transformations, Geometrical Framework for Vision, 2D and 3D Images Interpretation, Industrial Applications.

**Unit-II**

**Digital Image:** Basics of Image Processing, Image Acquisition, Segmentation, Binary and Grey Morphology Operations, Thresholding, Filtering, Edge and Corner Detection, Features Detection, Contours, Tracking Edges and Corners, Object Detection and Tracking, Image Data Compression, Real Time Image Processing.

**Unit-III**

**Camera and Optical System:** Camera Technology, Analog and Digital Camera, Camera Model, CCD and CMOS Technology, Sensor Size, Intrinsic and Extrinsic Camera Parameters, Camera Calibration, Systems of Lenses, Thin Lens, Beam Converging and Beam Diverging Lenses, General Imaging Equation, Aberrations, Practical Aspects.

**Unit-IV**

**Fundamental of Robot. Robotics:** Introduction, Robot, Definition, Robot Anatomy, Robot Parts and Their Functions, Classification of Robot and Robotic Systems, Laws of Robotic, Co-Ordinate Systems, Drives and Control Systems, Power Transmission Systems, Planning for Navigation, Different Applications.

**Unit-V**

**Robot Actuator Effectors:** Types of End Effectors, Types of Grippers, Interface, Sensors, Touch and Tactile Sensors.

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**RECOMMENDED BOOKS**


- Computer Vision: Algorithms and Applications, Richard Szeliski, Ed. Springer, ISBN-10: 1848829345, ISBN-13: 978- 1848829343, Publishing, 2010.
- Handbook of Robotics, Bruno Siciliano, Ed. Springer-Verlag Berlin and Heidelberg GmbH & Co. K, ISBN-10: 354023957X, ISBN-13: 978-3540239574, Publishing, 2008.


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## COURSE OUTCOMES

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

CO1. tell about kinematics and dynamics.

CO2. summarize the digital image processing techniques.

CO3. build basics of camera technology.

CO4. examine the fundamentals of robotics and its components

CO5. design controllers for tracking control of a robot.

CO6. develop the concepts of computer vision for motion control of robotic systems.

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

**ANNEXURE - VI**

# *Experiments List / Lab manuals of Laboratory Courses*

## *B.Tech VI Semester*

## *(Batch Admitted in 2019-20)*

## *(Information Technology)*

## *Under Flexible Curriculum*

***[ITEM IT - 10]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPILER DESIGN LAB
## 160601 (DC-12)

## LIST OF EXPERIMENTS

**1)** Write a program to convert NFA to DFA.

**2)** Write a program to minimize DFA.

**3)** Develop a lexical analyzer to recognize a few patterns.

**4)** Write a program to parse using Brute force technique of Top down parsing.

**5)** Develop LL (1) parser (Construct parse table also).

**6)** Develop an operator precedence parser (Construct parse table also).

**7)** Develop a recursive descent parser.

**8)** Write a program for generating for various intermediate code forms.

i) Three address code

ii) Polish notation

**9)** Write a program to simulate Heap storage allocation strategy.

**10)** Generate Lexical analyzer using LEX.

**11)** Generate YACC specification for a few syntactic categories.

**12)** Given any intermediate code form implement code optimization techniques.

---

## COURSE OUTCOMES

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

**CO1:** discuss the knowledge of patterns, tokens & regular expressions in programming for problem solving.

**CO2:** design and Implement various parsing techniques.

**CO3:** operate different types of compiler tools.

**CO4:** develop programs for implementing code optimization techniques.

**CO5:** build symbol table and intermediate codes.

**CO6:** demonstrate the functionalities of different phases of the compilation process.

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

**ANNEXURE - VII**

# *Scheme & Syllabi*
# *of*
# *B. Tech IV Semester*
# *(Batch Admitted in 2020-21)*
# *(Information Technology (IT) / Internet of Things (IoT) / Artificial Intelligence & Robotics (AIR))*
# *Under Flexible Curriculum*

***[ITEM IT - 11]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Scheme of Examination

**GROUP Y: I Semester**

## B. Tech. I Semester (Information Technology)

***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 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 | AO |
| | | | **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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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## Scheme of Examination

## GROUP Y: II Semester

## B. Tech. II Semester (Information Technology)

***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 Exam |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Slot | | | Practical Slot | | | | | | | | |
| | | | | End Sem. | Mid Sem. | Quiz/ Assignment | 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 | 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 |
| 6. | 100017 | HSMC | Language Lab | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | AO |
| | | | 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

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# 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. 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 | | | | 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.** | 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 | - | 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** | **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 | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory | | | | Lab | NEC | Theory | | | Lab | 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% | 4.35% | 65.22% | - | - | 30.43% | 4.35% | 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. 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 | | | | 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.** | 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.** | 100009 | **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 Engaging Course (Informal Learning) | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 | Interactive | SO |
| **Total** | | | | **250** | **50** | **100** | **100** | **230** | **60** | **60** | **850** | **10** | **5** | **8** | **19** | **-** | **-** |
| **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** | | | | | | | | | | | | | | | | | |

$ **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 | NEC | Theory | | | Lab | NEC | |
| Offline | Online | Blended | | Offline | Interactive | PP | A+O | MCQ | SO | SO | |
| | | Offline | Online | | | | | | | | |
| 04 | 02 | 06 | 03 | 03 | 01 | 09 | - | 05 | 04 | 01 | 19 |
| 21.05% | 10.53% | 31.58% | 15.79% | 15.79% | 5.26% | 47.37% | - | 26.32% | 21.05% | 5.26% | Credits % |

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Department of Information Technology

## Scheme of Examination

## B.Tech. Internet of Things (IoT)

## I 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 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 Question; **AO:** Assignment + Oral; **OB:** Open Book; **PP:** Pen Paper

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

## Department of Information Technology

## Scheme of Examination

## B.Tech. Internet of Things (IoT)

## II 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 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 | 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 | PP |
| 6. | 100017 | HSMC | Language Lab | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | AO |
| **Total** | | | | **300** | **100** | **100** | **240** | **80** | **80** | **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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# 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)

## III Semester

***for batch 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/ Assign ment | | Lab work & Session al | Skill Based Mini Project | | | | | | | |
| **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 Engaging Course (Informal Learning)** | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 | Interactive | SO |
| **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** | **14** | **2** | **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 | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory | | | | Lab | NEC | Theory | | | Lab | NEC | |
| Offline | Online | Blended | | Offline | Interactive | PP | A+O | MCQ | SO | SO | |
| | | Offline | Online | | | | | | | | |
| 04 | - | 08 | 04 | 06 | 01 | 16 | - | - | 06 | 01 | 23 |
| 17.39% | - | 34.78% | 17.39% | 26.09% | 4.35% | 69.56% | - | - | 26.09% | 4.35% | 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. Internet of Things (IoT)

## IV Semester

***for batch 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. | $Proficiency in subject /course | Mid Sem. Exam. | Quiz/ Assign ment | | 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 **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

| 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 | | | | | | | | |
| 01 | - | 10 | 05 | 03 | 01 | 12 | - | 03 | 04 | 01 | 20 |
| 5.00% | - | 50.00% | 25.00% | 15.00% | 5.00% | 60% | - | 15.00% | 20.00% | 5.00% | Credits % |

# 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 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 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, Visit / Virtual Visit to local Areas, Familiarization to Dept./Branch & Innovations** | | | | | | | | | | | | | | | |

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

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# 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 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 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. | 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 | 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 | PP |
| 6. | 100017 | HSMC | Language Lab | - | - | - | 60 | 20 | 20 | 100 | - | - | 2 | 1 | AO |
| **Total** | | | | **300** | **100** | **100** | **240** | **80** | **80** | **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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# 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 | | | | | | | 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 | 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. | 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 Mentoring | SO |
| 8. | 200XXX | CLC | **Novel Engaging Course (Informal Learning)** | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 | 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** | **14** | **2** | **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 | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Theory | | | | Lab | NEC | Theory | | | Lab | NEC | |
| Offline | Online | Blended | | Offline | Interactive | PP | A+O | MCQ | SO | SO | |
| | | Offline | Online | | | | | | | | |
| 04 | - | 08 | 04 | 06 | 01 | 16 | - | - | 06 | 01 | 23 |
| 17.39% | - | 34.78% | 17.39% | 26.09% | 4.35% | 69.56% | - | - | 26.09% | 4.35% | 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)

## 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. | $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 | CLC | **Novel Engaging Course (Informal Learning)** | - | - | - | - | 50 | - | - | 50 | - | - | 2 | 1 | Interactive | SO |
| **Total** | | | | **250** | **50** | **100** | **100** | **290** | **80** | **80** | **950** | **14** | **01** | **10** | **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 **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

| 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 | | | | | | | | |
| - | - | 10 | 05 | 04 | 01 | 12 | - | 03 | 04 | 01 | 20 |
| - | - | 50.00% | 25.00% | 20.00% | 5.00% | 60% | - | 15.00% | 20.00% | 5.00% | Credits % |

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER GRAPHICS & MULTIMEDIA
## 160411

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | 2 | 4 |

## COURSE OBJECTIVES

- To become familiar with computer graphics techniques and display devices.
- To enhance the proficiency in image representations, 2D and 3D graphics transformations.
- To develop awareness with various illumination, color models and multimedia system.

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**Unit-I**

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

**Unit-II**

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

**Unit-III**

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

**Unit-IV**

**Clipping:** Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, **Basic Illumination Models:** Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models: like RGB, YIQ, CMY, HSV etc.

**Unit-V**

**Multimedia System:** An Introduction, Multimedia hardware and software, Multimedia Applications, Multimedia System Architecture, Multimedia Authoring. Data & File Format standards: RTF, TIFF, MIDI, JPEG, DIB, MPEG. Audio: digital audio, MIDI, ~~processing sound,~~ Sampling, compression. Video: AVI, 3GP, MOV, MPEG, Compression standards, Compression through spatial and temporal redundancy.

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**RECOMMENDED BOOKS**


- Donald Hearn and M.P. Becker : Computer Graphics, PHI Publication
- FoleyVandam, Feiner, Hughes : Computer Graphics principle and Practice
- Rogers : Principles of Computers Graphics, TMH
- Sinha and Udai : Computer Graphics, TMH
- Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR


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**COURSE OUTCOMES**

After completion of the course students will be able to:

CO1. explore various display devices and applications of computer graphics.

CO2. illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms.

CO3. apply 2-dimensional, 3-dimensional transformations and projections on images.

CO4. classify methods of image clipping and various algorithms for line and polygon clipping.

CO5. apply appropriate filling algorithms, hidden surface elimination algorithm on images.

CO6. summarize various color models, shading methods and multimedia system.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## SOFTWARE ENGINEERING
## 160412

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | 2 | 4 |

## COURSE OBJECTIVES

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

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**Unit - I**

**Introduction to Software Engineering:** Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model**: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

**Unit - II**

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

**Unit - III**

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

**Unit - IV**

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

**Unit - V**

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

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. explain the various fundamental concepts of software engineering.

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

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

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

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER NETWORKS
## 160413

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | - | 3 |

## COURSE OBJECTIVES

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

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**Unit-I**

**Introduction:** Computer Network, Types- LAN, MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode, X.25.

**Unit-II**

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

**Unit-III**

**Data Link Layer:** Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

**Unit-IV**

**Network Layer & Transport Layer:** Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

**Unit-V**

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

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**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.


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## COURSE OUTCOMES

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

CO1. explain the fundamental concepts of computer network.

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

CO3. identify various parameter for affecting the performance of computer network.

CO4. analyze the concepts of communication using various layer of OSI model.

CO5. evaluate the performance of computer network in congestion and Internet.

CO6. design the network environment and applications for implementation of computer networking concept.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## CYBER SECURITY
## 100009

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | - | - | 2 |

## COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyse various cyber-attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cybercrime.

---

**Unit-I**

**Introduction-** Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

**Unit-II**

**Basics of Internet & Networking-** Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

**Unit-III**

**Cryptography and Network Security-** Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric Key and Public Key Cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

**Unit-IV**

**Cyber Security Threats and Vulnerabilities-** Hacker, Types of Hacker- White, Gray and Black, **Malicious Software's:** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

**Unit-V**

**Cyber Crime Investigation and Legal Issues:** Intellectual Property, Privacy Issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

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**RECOMMENDED BOOKS:**

- Cryptography and Network Security, 4/E, William Stallings, 4 th edition, Pearson publication
- Computer Security: Principles and Practice, Stallings William, Pearson publication
- Investigating Network Intrusions and Cybercrime, EC-Council Press
- Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
- Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

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**COURSE OUTCOMES:**

After completion of the course students would be able to:

CO1. tell the basic terminologies of cyber security.

CO2. explain the basic concept of networking and internet.

CO3. apply various methods used to protect data in the internet environment in real world situations.

CO4. discover the concept of IP security and architecture.

CO5. compare various types of cyber security threats/vulnerabilities.

CO6. develop the understanding of cybercrime investigation and IT ACT 2000.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## PYTHON PROGRAMMING LAB
## 160414

| 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.

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**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


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## COURSE OUTCOMES

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

CO1. solve computational problem using python language

CO2. familiar with basics syntax and features of python programming language

CO3. hands on experience to online coding tools like colab.

CO4. design a program utilizing the features of object oriented concept.

CO5. utilize some of the libraries available for solving problems.

CO6. apply skill of identifying appropriate python constructs for problem solving.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

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

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER ARCHITECTURE AND MICROPROCESSOR
## 230401/240401

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | 2 | 4 |

## 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.
- To understand different processors and basic architecture of 8/16 bit microprocessors.

---

**Unit -I**

**Introduction:** CPU structure and functions, processor organization, ALU, data paths, internal registers, status flags; System bus structure: Data, address and control buses. Processor control, micro-operations, instruction fetch, hardwired control, micro programmed control, microinstruction sequencing and execution.

**Unit- II**

Instruction set principles, machine instructions, types of operations and operands, encoding an instruction set, assembly language programming, addressing modes and formats.

**Unit –III**

**Input-Output Organization:** I/O organization; I/O techniques: interrupts, polling, DMA; Synchronous vs. asynchronous I/O.

**Memory Organization:** Memory system, internal and external memory, memory hierarchy, cache memory and its working, virtual memory concept.

**Unit –IV**

**Microprocessors:** 8085 microprocessor architecture; Instruction set, instruction types and formats; Instruction execution, instruction cycles, different types of machine cycles and timing diagram.

16-bit microprocessors, 8086 architecture, registers, memory segmentation and addressing,

**Unit-V**

**Basic peripherals and interfacing:** 8255, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing, 8254, 8259, 8251.

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**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.
- 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)


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## COURSE OUTCOMES

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

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

CO2. develop the fundamental concept to understand the working of computer architecture and microprocessor.

CO3. explain the basic concept of input output and memory organization.

CO4. develop the skill of writing assembly language programming.

CO5. build a system using peripheral devices and controllers for 8086 microprocessors.

CO6. apply the concept computer architecture and microprocessor in solving real world problems.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## CLOUD COMPUTING
## 230402/240402

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

## COURSE OBJECTIVES

- To understand Cloud Computing concepts, technologies, architecture and applications.
- To understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- To understand different cloud programming platforms and tools to develop and deploy applications on cloud.

---

**Unit- I**

**Cloud Architecture and Model:** Technologies for Network-Based System, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics, Cloud Services, Cloud models (IaaS, PaaS, SaaS), Public vs Private Cloud, Cloud Solutions Cloud ecosystem, Service management, Computing on demand.

**Unit- II**

**Virtualization:** Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices. Virtual Clusters and Resource management, Virtualization for Data-center Automation.

**Unit- III**

**Cloud Infrastructure:** Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

**Unit -IV**

**Programming Model:** Parallel and Distributed Programming Paradigms- MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure.

**Unit -V**

**Security in the Cloud:** Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

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**RECOMMENDED BOOKS**


- Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
- John W. Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
- Kumar Saurabh, " Cloud Computing — insights into New-Era Infrastructure", Wiley India,2011
- George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly
- James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.


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**COURSE OUTCOMES**

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

CO1. define various basic concepts related to cloud computing.

CO2. identify the architecture, infrastructure and delivery models of cloud computing.

CO3. apply suitable virtualization concepts.

CO4. choose the appropriate programming models and public cloud platforms.

CO5. analyse various security issues in cloud computing.

CO6. compose virtualization, security and programming modules in cloud computing solutions.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## SOFTWARE ENGINEERING
## 230403/240403

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | 2 | 4 |

## COURSE OBJECTIVES

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

---

**Unit - I**

**Introduction to Software Engineering:** Definition, Software Engineering-Layered Technology, Software Characteristics and Components, **Software Model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection Criteria of Model**: Characteristics of Requirements, Status of Development Team, Users Participation, Type of Project and Associated Risk.

**Unit - II**

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

**Unit - III**

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

**Unit - IV**

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

**Unit - V**

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

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. explain the various fundamental concepts of software engineering.

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

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

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

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## IOT ARCHITECTURE & PROTOCOLS
## 230404

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

**COURSE OBJECTIVES**

- Familiarize the student with the basic taxonomy and terminology of the IOT Architecture & Protocols.
- Provide detailed knowledge about various layers, protocols and devices that facilitate IoT service.

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**Unit-I**

**Introduction:** IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, IoT Communication models, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics

**Unit-II**

**IoT Reference Architecture:** Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints.

**Unit-III**

**IoT Data Link Layer & Network Layer Protocols:** PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4,IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

**Unit-IV**

**IoT Transport & Session Layer Protocols:** Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS), Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT.

**Unit-V**

**IoT Service Layer Protocols & Security Protocols:** Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC802.15.4 , 6LoWPAN, RPL, Application Layer: UPnP, SCADA, Authentication Protocols.

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## RECOMMENDED BOOKS


- Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Daniel Minoli, ISBN: 978-1-118-47347-4, Willy Publications ,2016
- From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand,Stamatis Karnouskos, David Boyle, 1st Edition, Academic Press, 2015.
- Architecting the Internet of Things, Bernd Scholz-Reiter, Florian Michahelles, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
- Sensors, Actuators and Their Interfaces, N. Ida, Scitech Publishers, 2014.
- IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, CISCO Press, 2017
- Internet of Things: Architectures, Protocols and Standards , Simone Cirani , Gianluigi Ferrari , Marco Picone , Luca Veltri, Willy Publications ,2018.


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## COURSE OUTCOMES

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

CO1. explain the fundamental concepts of IoT Architecture.

CO2. illustrate the basic taxonomy & terminologies of IoT communication protocols.

CO3. develop a concept for understanding IoT technologies**.**

CO4. build the skill for establishing communication among IoT devices.

CO5. analyze various IoT Application layer Protocols in IoT.

CO6. design IoT-based systems for real-world problems.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## MACHINE LEARNING AND OPTIMIZATION
## 240404

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | 2 | 4 |

**COURSE OBJECTIVES**

- Identify and develop operational research models from the verbal description of the real system.
- Analyse the results to resolve resource optimization
- To practice their skills on many well-known real-life problems.

---

**Unit-I**

**Introduction to ML:** Statistical Learning, Supervised vs Unsupervised Learning, Regression vs Classification Problems, Formulation of Design Problems as Mathematical Programming Problems, Linear Regression, Multiple Linear Regression, Logistic Regression, K-Nearest Neighbour Classification.

**Unit-II**

**Tree Based Methods:** Decision Tree Learning: Decision Tree Representation, Appropriate Problems for Decision Tree Learning, Random Forest, Issues in Decision Tree Learning. Naïve Bayes Classifier, Support Vector Machines.

**Unit-III**

**Introduction to Optimization Algorithms:** Optimization Algorithms, Engineering Applications of Optimization Algorithms, Objective Function, Optimization Algorithms for Differentiable and Non-Differentiable Objective Functions: Stationary and Critical Point, Functions of Single and Two Variables; Global Optimum, Single Variable Optimization, Two Variable Optimizations. First Order Algorithms, Local Descent Algorithms, Bracketing Algorithms. Stochastic Algorithms, Population Based Algorithms: Introduction, Genetic Algorithms.

**Unit-IV**

**Artificial Neural Network:** Neural Network Representation, Neural Networks as a Paradigm for Parallel Processing, Linear Discrimination, Pairwise Separation, Gradient Descent, Perceptron, Training A Perceptron, Multilayer Perceptron, Back Propagation Algorithm, Dynamically Modifying Network Structure.

**Unit-V**

**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, Ensemble Methods, Bagging and Boosting, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Assessing a Classification Algorithm's Performance (ROC Curve), Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets.

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**RECOMMENDED BOOKS**


- Algorithms for optimization, Mykel and Tim, The MIT Press
- Principles of Soft Computing, S.N. Deepa, Fundamentals of Computer Algorithms, Wiley.
- Optimization for Engineering Design: Algorithms and Examples (2nd ed.), Kalyanmoy Deb, Prentice Hall India Learning Private Limited, 2012.
- Introduction to Statistical Learning, Gareth James et al, Springer texts in statistics, 2015.
- Machine Learning (1st ed.), T. M. Mitchell, McGraw Hill, 2017. ISBN 978-1259096952.


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## COURSE OUTCOMES

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

CO1. summarize different kind of machine learning algorithms.

CO2. demonstrate a familiarity with major optimization algorithms.

CO3. apply optimization algorithms to solve real world problems.

CO4. formulation of design problems as mathematical programming problems.

CO5. examine supervised and unsupervised learning methods for real-life problems.

CO6. deploy machine learning models for real time problems.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## NETWORK & WEB SECURITY
## 230405/240405

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | - | 3 |

## COURSE OBJECTIVES

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

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**Unit-I**

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

**Unit-II**

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

**Unit-III**

**Hash Functions:** Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). Authentication: Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

**Unit -IV**

**IP & Web Security Overview:** SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). IDS (Intrusion detection system):

Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. Firewalls: Types, Functionality and Polices.

**Unit -V**

**Phishing:** Attacks and its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. Denial of Service Attacks: Smurf Attack, SYN Flooding, Distributed Denial of Service. Hacker: Hacking and Types of Hackers, Foot Printing, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.
CO2. illustrate fundamentals of number theory, attacks and security principles.
CO3. apply number theory and various algorithms to achieve principles of security.
CO4. analyze the cause for various existing network attacks and describe the working of available security controls.
CO5. examine the vulnerabilities in IT infrastructure.
CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## PYTHON PROGRAMMING LAB
## 230406

| 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.

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**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


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## COURSE OUTCOMES

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

CO1. solve computational problem using python language

CO2. familiar with basics syntax and features of python programming language

CO3. hands on experience to online coding tools like colab.

CO4. design a program utilizing the features of object oriented concept.

CO5. utilize some of the libraries available for solving problems.

CO6. apply skill of identifying appropriate python constructs for problem solving.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DESIGN AND THINKING LAB
## 240406

| L | T | P | Total Credits |
|---|---|---|---|
| - | - | 2 | 1 |

**PREREQUISITES**

C, C++, Basic electronics.

**COURSE OBJECTIVE:**

The students will:

- Learn how to frame the design challenge properly
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller
- Learn how to design successful products or enterprises

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**Unit-I**

**Introduction:** Introduction to microcontroller, embedded system, 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.

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**RECOMMENDED BOOKS**:

- Arduino for Dummies, by John Nussey (2013)
- Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School - IdrisMootee

**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)

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

CO4. design and develop Smart systems applications.

CO5. identify an Opportunity from a Problem

CO6. build Arduino board using different sensors.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - VIII**

# *Experiments List / Lab manuals of Laboratory Courses*

## *B. Tech IV Semester*

## *(Batch Admitted in 2020-21)*

## *(Information Technology (IT) / Internet of Things (IoT) / Artificial Intelligence & Robotics (AIR))*

## *Under Flexible Curriculum*

***[ITEM IT - 12]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER ARCHITECTURE AND MICROPROCESSOR (230401/240401)

## LIST OF EXPERIMENT

1. Write an assembly language program to perform the subtraction of two 8-bit numbers using the 8085/8086 instruction set.
2. Write an assembly language program to move data blocks starting at location 'X' to location 'Y' without overlap using the 8085/8086 instruction set.
3. Write an assembly language program to move data blocks starting at location 'X' to location 'Y' with overlap using 8085/8086 instruction set.
4. Write an assembly language program to arrange a set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in the address data field using the 8085/8086 instruction set.
5. Write an assembly language program to perform the multiplication of two 8-bit numbers using the 8085/8086 instruction set.
6. Write an assembly language program to perform the division of two 8-bit numbers using the 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in an array of data using the 8085/8086 instruction set.
8. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using the 8085/8086 instruction set.
9. Write an assembly language program to convert a given hexadecimal number into its equivalent BCD number using the 8085/8086 instruction set.
10. Write an assembly language program to convert a given hexadecimal number into its equivalent ASCII number using the 8085/8086 instruction set.
11. Write an assembly language program to convert a given ASCII character into its equivalent hexadecimal number using the 8085/8086 instruction set.

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## COURSE OUTCOMES

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

CO1. explain types of instructions and addressing modes.

CO2. make use of Hex code needed in assembly language

CO3. experiment with various peripheral devices to interface with microprocessors.

CO4. simplify the arithmetic, Logical, etc. problems using the instruction set of 8086/8085 microprocessors.

CO5. determine the process required in interfacing with 8086/8085.

CO6. develop the assembly language programs in 8086/8085 to solve a real world problem.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER GRAPHICS & MULTIMEDIA
## (160411)

## LIST OF PROGRAMS

1. WAP to implement line generation using DDA algorithm.
2. WAP to implement line generation using Bresenham's line generation algorithm.
3. WAP to generate a circle using mid-point algorithm.
4. WAP to implement Bresenham's circle generation algorithm.
5. WAP to perform translation, rotation, scaling on 2D transformation.
6. WAP to perform scaling and shearing on 2D transformation.
7. WAP to implement translation of a line and triangle.
8. WAP to implement rotation of a line and triangle.
9. WAP to implement scaling transformation.
10. WAP to fill polygon using seed filling algorithm.
11. WAP to implement 3D rotation about an arbitrary axis.
12. WAP to implement Cohen Sutherland line clipping.

---

**COURSE OUTCOMES**

After completion of the course students will be able to:

CO1. understand the basic concepts of computer graphics.

CO2. demonstrate scan conversion problems using programming language.

CO3. implement the concepts of geometric transformation of 2D and 3D objects.

CO4. apply clipping and filling techniques for modifying an object.

CO5. understand the practical implementation of modelling and rendering.

CO6. demonstrate the concept of viewing of 2D objects.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## SOFTWARE ENGINEERING LAB

## (160412/230403/240403)

## LIST OF EXPERIMENTS

**Experiment 1: Identify the requirements from problem statements**
Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements

**Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model**
Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics

**Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios**
Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include Relationship, Extend Relationship, Generalization Relationship, Identifying Actors, Identifying Use cases, Guidelines for drawing Use Case diagrams

**Experiment 4: E-R modeling from the problem statements**
Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity , Entity Generalization and Specialization , Mapping Cardinalities , ER Diagram, Graphical Notations for ER Diagram , Importance of ER modeling

**Experiment 5: Modeling UML Class diagrams and Sequence diagrams**
Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages

**Experiment 6: Modeling Data Flow diagrams**
Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD

**Experiment 7: Create flow chart for an algorithm using Raptor**
Assignment, Call, Input, Output, Selection and Loop symbols.

**Experiment 8: Estimation of Test coverage metrics and structural complexity**
Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits.

**Experiment 9: Designing Test Suites**
Software Testing , Standards for Software Test Documentation , Testing Frameworks , Need for Software Testing ,Test Cases and Test Suite , Types of Software Testing , Unit Testing , Integration Testing , System Testing , Example , Some Remarks.

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**RECOMMENDED TOOLS**

- Selenium

- Star UML
- UMLet
- Raptor

**REFERENCE**

- Virtual Labs (http://vlabs.iitkgp.ernet.in/se/)

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## COURSE OUTCOMES

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

CO1. demonstrate the basic concept of UML.

CO2. discuss the software development process using different tools.

CO3. display the various ways for solving different common modelling problems using UML.

CO4. use the knowledge of Software engineering and project management.

CO5. identify the vocabulary, rules and idioms of the UML and learn how to model it effectively.

CO6. design the software systems using software engineering concepts.

---

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## MACHINE LEARNING AND OPTIMIZATION (240404)

## LIST OF PROGRAMS

1. Implementation of linear regression using any of the tools or language like XLminer, matlab, R or python over the wine quality dataset available on UCI repository.
2. Implement Logistic regression model.
3. Implement the decision tree algorithms like ID3 etc. over any dataset from Kaggle or UCI repository.
4. Implement random forest over the physionet challenge 2012 dataset for mortality prediction.
5. Implement K-nearest neighbours' algorithm over the dataset from Kaggle or any other repository.
6. Implement the K-means partitioning clustering algorithm.
7. Implement the simple AND, OR and EX-OR gate using neural networks.
8. Implement the classification over any dataset using ANN.
9. Use a bagging, boosting approach to improve the performance of your algorithm over any dataset from a trusted repository.
10. Use the libraries in python for assessing and visualizing the performance of classification algorithms.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## PYTHON PROGRAMMING LAB
## (230406)

## 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 find the greater of two given numbers in two different classes using friend function.
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**

## DESIGN AND THINKING LAB
## (240406)

## 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 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.

---

## 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. interface different sensors to embedded boards like arduino.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - IX**

# *Skill Based Mini Projects of Laboratory Courses*

## *B. Tech IV Semester (Batch Admitted in 2020-21)*

## *(Information Technology (IT) / Internet of Things (IoT) / Artificial Intelligence & Robotics (AIR))*

## *Under Flexible Curriculum*

***[ITEM IT - 13]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER ARCHITECTURE AND MICROPROCESSOR (230401/240401)

## LIST OF SKILL BASED MINI PROJECT

1. Design an interface Temperature Controller using microprocessor 8085/8086.
2. Design a Traffic light controller using 8085/8086 microprocessor.
3. Design a Night light saver using 8085/8086 microprocessor.
4. Design an interfacing with Stepper Motor controller using 8085/8086 microprocessor.
5. Design an interfacing with DC motor controller using 8085/8086 microprocessor.
6. Design an Interfacing with keypad using 8085/8086 microprocessor.
7. Design an interfacing with LED's using 8085/8086 microprocessor.
8. Design an interfacing with switches using 8085/8086 microprocessor.
9. Design an interfacing with ADC using 8085/8086 microprocessor.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COMPUTER GRAPHICS & MULTIMEDIA
## (160411)

## LIST OF SKILL BASED MINI PROJECT

1. Using C/C++/Python language, draw a Flag using any three colors in the center of the computer screen.

2. Draw a Pyramid using the star key of the keyboard in C/C++/Python language.

3. Design a front face of the House with door and window in C/C++/Python language.

4. Implement a Balloon with multicolor in the center of the computer screen.

5. The task is to draw a smiley face using graphics in C/C++/Python language.

6. Implement a project to draw the scenario of Rainfall.

7. Using C/C++/Python to draw a football ground using computer graphics.

8. Design a wheel in the center of the screen using C/C++.

9. Draw a car using computer graphics programming in C/C++.

10. To draw a traffic light signal using computer graphics in C/C++/Python language.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## SOFTWARE ENGINEERING LAB (160412/230403/240403)

## LIST OF SKILL BASED MINI PROJECT

**Note: In every project students must have to**

- **Design the SRS of the project.**
- **Draw the various ER diagram, DFD and Use Case diagram of the project.**
- **Design the test case of the project.**

## Mini Skill Project 01

**Delivery Agent System**

There are many online shopping portals such as Flipkart, Amazon, Snapdeal, etc. are active in the Indian market. One major task is to deliver an online books T-shirt to the customers as first as possible in a cost-effective (cheapest) manner. A delivery agent system, which would automatically receive a delivery request from an online portal and identify the couriers, whom the delivery job can be assigned.

**Input:**
• Shipping details (source and destination) locations
• Couriers' details in different localities.
• Service offering for each courier company.
**Functions:**
• Booking delivery
• Status of delivery
• Cancellation of booking
**Output:**
• Booking confirmation, if booking is successful.
• Reporting delivery status
• Cancellation of booking confirmation

## Mini Skill Project 02

**Payroll Management System (PMS)**

The Employee and Payroll Systems objective is to provide a system which manages the employee details, the Payroll activity done in a company depending upon the employees attendance and its calculation which is very huge. The users will consume less amount of time through computerized system rather than working manually. The system will take care of all the payroll activities like managing each employee's attendance, the number of leaves taken by that particular employee and calculation in a very quick manner and it avoids Data storing is easier. Paper work will be reduced and the company staffs spend more time on monitoring the progress. The system is user friendly and easy to use. All the important data's will be stored in the database and it avoids any miscalculation. The "Employee and Payroll System "is based on maintaining each employee records and calculating his/her salary depending on the workdays. The first activity is based on saving the employees details where each employee will be given a unique Employee ID. Now based on the no of days an employee attended per month,

salary will be calculated by checking the no of workdays of a company and his/her basic salary and a separate salary slip will be provided for reference.

**Inputs:**
- Employee details (employee no, name, address, designation, department, achievements)
- Accounts details (salary of each employee, deduction, TA, DA, HRA, other allowance, PF)
- Leave information (no of leave taken by each employee)

**Output:**
- Salary slip
- Detailed salary report
- Deduction details
- Leave information

## Mini Skill Project 3

**Online Toll Plaza System**

Now-a-days, cashless transaction is becoming popular among the users because it is easy to handle, and it does not require to carry cash in hand. Typically, in India, road tolls are collected from cars manually for which the cars need to stop to pay the toll fee. In contrast, the objective is to make the system Online, so that the toll fee is automatically deducted from the user. Therefore, users credit their Online account (consider this as eWallet), and money is automatically deducted when the cars pass the toll system. As a result, the users do not have to wait for manual toll fee payment. Concurrently, administrator can also view all transactions from anywhere. Finally, the administrator can view the total income in a day-to-day basis, and can also analyze the traffic pattern as well.

**Inputs:**
• User Information (Name, Car Number, Email Address, Password, Money in eWallet)
• Administrator Information (Email Address, Password)

**Operations:**
• User
  - Log-In
  - Credit in eWallet
  - Check eWallet Balance
  - Log-Out

• System
  - Check the car number
  - Required Fee Available
  - Allow the car to pass
  - Deduct money from eWallet
  - Required Fee NOT Available
  - Do Not Allow the car to pass
  - Fee Payment is done manually
  - Allow the car to pass
  - Total Income is stored in a database

• Administrator
  - Log-In

- View transactions
- View total income

**Outputs:**

• Display day-wise transactions to administrator
• User can view his/her own transactions

## Mini Skill Project 04

**Online Examination System**

Now-a-days, Online examination system has become popular for competitive examinations because of its unique features such as auto-evaluation, speed and accuracy. Moreover, it also helps environments by reducing the use of paper. In such a system, students are asked to select answers from multiple options given for a single question. Likewise, there are several questions which appear in the students' systems. The questions and multiple options are saved in a database along with desired answers. Typically, a student can edit an answer after saving it, however, editing cannot be done after submitting the answer. Another user is also there – administrator. The administrator can create, modify and delete questions and accordingly, the question is updated in the system.

**Inputs:**

- Subject Information with Code, so that all subjects can be identified using unique codes.
- User Information
- If Student- Student Information (Name, Roll No, Email Address, Contact Number, Password)
- If Administrator (Email Address, Password)
- Set of Questions with multiple answers for each stored in a database along with desired answers.

**Operations:**

• Administrator
  - Log-In
  - CREATE, MODIFY or DELETE questions. Accordingly, the question set must be updated.
  - Log-Out

• Student
  - Log-In (Time starts)
  - Answer the questions – SAVE and SUBMIT
  - Log-Out (Automatically logged out after Timeout)

**Outputs:**

- Display the result in DESCENDING order according to obtained marks with Roll Number.
- The result is also saved into a database for future use.

## Mini Skill Project 5

### Online Health Monitoring System

Online health monitoring or Online patient monitoring system (OHMS) is a promising technology to enable patient monitoring outside the conventional clinical system, i.e., the patient can be monitored remotely. Consequently, such system increases the access to care the patients and decreases the delivery cost related to healthcare. Typically, in OHMS, two type of users are there – doctors and patients. Different physiological parameters of the patient are monitored (using sensors), and the monitored data is stored in a server. The stored data is accessible from anywhere through user authentication. On the other hand, doctors can check the health status of a patient registered with the doctor. Therefore, the doctor can only access the physiological data of a patient if and only if he/she is registered with the doctor. Depending on the monitored values, adequate measures can be taken by the doctors. The patient can also view his/her health status. For authenticity, both the users need to login into the system.

**Inputs:**

- User Information
- Doctor – (Name, Email Address, Password)
- Patient – (Name, Email Address, Password, DOB)
- Predefined Sensors (such as temperature, blood pressure and heart rate)

**Operations:**

- Patient
    - Log-In
    - View health status
    - Ask doctor(s) to consult
    - Payment (Consultancy Fee)
    - Log-Out
- Doctor
    - Log-In
    - Monitor health status of registered patients to him/her
    - Ask patient(s) to consult
    - Log-Out

**Outputs:**

- Display health status
- Consult with doctors/patients

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## MACHINE LEARNING AND OPTIMIZATION (240404)

## LIST OF SKILL BASED MINI PROJECT

1. Design and implement heart disease prediction using different classification algorithm and analyse the best over the dataset.
2. Design and implementation of Animal Kingdom Classification using CNN with the help of available libraries in python.
3. Apply the classification algorithms over the time series dataset by transforming the dataset into static values.
4. With the help of Support vector machine algorithm classify any suitable dataset available over the trusted repository.
5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
6. Design the game of tic-tac-toe etc.
7. Optimize the performance of your classification algorithm using the applicable optimization algorithm like swarm based, genetic algorithm.
8. Compare the performance of different algorithms over physionet challenge 2012 dataset.
9. Implement an algorithm for Parkinson disease detection and validate its performance with cross-validation approach.
10. Implement a movie recommendation system using any algorithm over the dataset from trusted repository.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## PYTHON PROGRAMMING LAB
## (230406)

## 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 a real-time, User friendly Currency Converter.
4. Design and implementation of a File Manager which supports various types of files.
5. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
6. Design any game of your choice like tic-tac-toe etc.
7. 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.
8. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
9. Design a program for spam filtering.
10. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
11. Implement countdown clock and timer.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DESIGN AND THINKING LAB
## (240406)

## 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 arduino uno. Control the stepper motor/locking mechanism wirelessly using NodeMCU by giving instructions to the lock accordingly.
2. Design Intelligent water level management system using through depth sensor the Arduino UNO 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 Arduino board and mobile-based Short Message Service (SMS) application working functionality with Wi-Fi connectivity to establish communication between the Arduino module and automated home appliances.
5. Design and development Intelligent Automatic Irrigation System using an Arduino microcontroller, 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 Arduino 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.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - X**

# *Scheme, Syllabi, List of Experiments and Skill Based Mini Projects of B. Tech I Semester (Batch Admitted in 2021-22) (Artificial Intelligence & Data Science (AI&DS) / Artificial Intelligence & Machine Learning (AI&ML)) Under Flexible Curriculum*

***[ITEM IT - 14]***

# 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 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. | 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 (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 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 % |

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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## Department of Information Technology

## Scheme of Evaluation

## B. Tech. I Semester (*B. Tech 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 | | | | | | | 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 | 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** | **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.**

**$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 % |

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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.

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**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.

**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.

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**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.


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## 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. understand pattern discovery, data handling and data visualization

CO5. analyze the general modelling process in Data Science.

CO6. understand the real world problems and applications of AI and DS for solving the problems.

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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.

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**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.


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## 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. learn about and practice a variety of Supervised and Unsupervised Learning approaches.

CO4. familiarize and learn about the latest trends and research in the field.

CO5. understand the real world problems and applications of AI and ML for solving the problems.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO COMPUTER PROGRAMMING (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.

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**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.


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## 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
## (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+√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
```

(v)

```
    *
   * * *
  * * * * *
 * * * * * * *
* * * * * * * * *
```

(vi)

```
* * * * * * * * *
 * * * * * * *
  * * * * *
   * * *
    *
```

(vii)

```
        1
      1 2 1
    1 2 3 2 1
  1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

(viii)

```
A B C D E F
A B C D E
A B C D
A B C
A B
A
```

(ix)

```
1
1 2 3
1 2 3 4 5
1 2 3
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.

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO COMPUTER PROGRAMMING (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.

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

**ANNEXURE - XI**

# *Scheme, Syllabi, List of Experiments and Skill Based Mini Projects of B. Tech I Semester (Batch Admitted in 2021-22) (Information Technology (IT) / Internet of Things (IoT)/ Artificial Intelligence and Robotics (AIR)) Under Flexible Curriculum*

***[ITEM IT - 15]***

# 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 (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/ Assign ment | | 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):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 | | | | | | |
| 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% | Credits % |

# 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/ 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 | 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 (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 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 | 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** | **14** | **03** | **04** | **19** | - | - |

**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 % |

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO COMPUTER PROGRAMMING
## 160112 / 230102

| 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.

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**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.


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## 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.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO COMPUTER PROGRAMMING
## (160112/230102)
## 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+√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
```

(v)

```
    *
   * * *
  * * * * *
 * * * * * * *
* * * * * * * * *
```

(vi)

```
* * * * * * * * *
 * * * * * * *
  * * * * *
   * * *
    *
```

(vii)

```
      1
     1 2 1
    1 2 3 2 1
   1 2 3 4 3 2 1
  1 2 3 4 5 4 3 2 1
```

(viii)

```
A B C D E F
A B C D E
A B C D
A B C
A B
A
```

(ix)

```
1
1 2 3
1 2 3 4 5
1 2 3
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.

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO COMPUTER PROGRAMMING (160112/230102)

## 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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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO INTERNET OF THINGS (IoT)
## 230101 (DC)

| 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.

**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


---

## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain 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. investigate challenges, security and privacy.

CO6. discuss different IoT enabled techniques behind interaction between things.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## INTRODUCTION TO ARTIFICIAL INTELLIGENCE
## 240101 (DC)

| 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.

**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.

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**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.


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## 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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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**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.

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**RECOMMENDED BOOKS**


- Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
- The Complete Computer upgrade and repair book, 3 rd 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)


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**COURSE OUTCOMES**

After completion of the course student would be able to:

CO1. understand 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. manage data backup and 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**

**ANNEXURE - XII**

# *Scheme & Syllabi*
# *of*
# *B. Tech II Semester*
# *(Batch Admitted in 2021-22)*
# *(Artificial Intelligence & Data Science (AI&DS) /*
# *Artificial Intelligence & Machine Learning (AI&ML))*
# *Under Flexible Curriculum*

***[ITEM IT - 16]***

# 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. II 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 | | | | | | | 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 | Offline | 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.**

**$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 | - | 08 | 04 | 03 | 13 | 03 | - | 03 | 19 |
| 21.05% | - | 42.11% | 21.05% | 15.79% | 68.42% | 15.79% | - | 15.79% | Credits % |

# 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. II Semester *(B. Tech 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 | | | | | | | 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. | 280201 | 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 |
| 3. | 280202 | DC | Data Structures | 50 | 10 | 20 | 20 | 60 | 20 | 20 | 200 | 3 | - | 2 | 4 | Blended (2/1) | PP |
| 4. | 280203 | 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.**

**$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 | - | 08 | 04 | 03 | 13 | 03 | - | 03 | 19 |
| 21.05% | - | 42.11% | 21.05% | 15.79% | 68.42% | 15.79% | - | 15.79% | Credits % |

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DIGITAL LOGIC DESIGN
## 270201/280201 (DC)

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | - | 3 |

## COURSE OBJECTIVES

- To understand the fundamental operating components of Digital Computers
- To learn various number systems, boolean algebra employed in digital computers
- To understand the concepts of counters, latches and flip-flops.

---

**Unit-I**

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

**Unit-II**

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

**Unit-III**

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers. Programmable Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL).

**Unit-IV**

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

**Unit-V**

Introduction to Memory, Memory Decoding, Error Detection and Correction, Sequential (or simple) programmable logic device (SPLD), Complex programmable logic device (CPLD), Field-programmable gate array (FPGA), Digital Logic Design: RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the basic components and functional units to define computer architecture

CO2. explain different number systems and basic operations employed at machine level.

CO3. develop the understanding of combinational circuits.

CO4. analyse the basic concept of sequential circuits.

CO5. compare and differentiate various memories used in Computers.

CO6. reduce the Boolean functions to mitigate hardware complexity issues.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## 270202/280202 (DC)

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | 2 | 4 |

## COURSE OBJECTIVES

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

---

**Unit-I**

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

**Unit-II**

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

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

**Unit-III**

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

**Unit-IV**

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

**Unit-V**

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

---

**RECOMMENDED BOOKS**

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

---

## COURSE OUTCOMES

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

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

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

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

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

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

CO6. design the optimal algorithmic solutions for various problems.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
## 270203/280203 (DC)

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | 2 | 4 |

## COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

---

**Unit-I**

**Introduction to C++ and Object Oriented Concepts:** Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

**Programming Techniques:** Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

**Unit-II**

**Classes & Objects:** Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

**Constructors and Destructors:** Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

**Unit-III**

**Polymorphism:** Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary

Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

**Unit-IV**

**Inheritance:** Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

**Unit-V**

**Pointer & File Concept:** Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

---

**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. tell the concepts of classes & objects and their significance in the real world.
CO2. explain the benefits of object oriented design.
CO3. build C++ classes using appropriate encapsulation and design principles.
CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.
CO5. choose appropriate object oriented programming concepts for solving real world problems.
CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

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

**ANNEXURE - XIII**

# *List of Experiments and Skill Based Mini Projects of Laboratory Courses*

## *B. Tech II Semester*

## *(Batch Admitted in 2021-22)*

## *(Artificial Intelligence & Data Science (AI&DS) / Artificial Intelligence & Machine Learning (AI&ML))*

## *Under Flexible Curriculum*

*[ITEM IT - 17]*

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## (270202/280202)
## LIST OF EXPERIMENTS

1. Write a program for implementing the following sorting methods to arrange a list of integers in ascending order:
   - **a.** Selection sort
   - **b.** Quick sort
   - **c.** Merge sort
2. Write a program to implement Stack using array.
3. Write a program to count the number of nodes in the binary search tree.
4. Write a program to implement stack using linked list.
5. Write a program to implement AVL Tree.
6. Write a program to implement Breadth First Search and Depth First Search.
7. Write a program to implement graph using array.
8. Write a program to implement Spanning Tree.
9. Write a program to implement Heap Sort.
10. Write a program to implement binary search algorithm.

---

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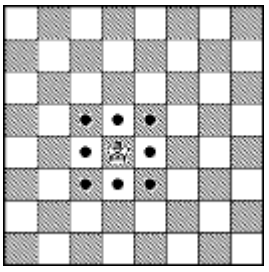
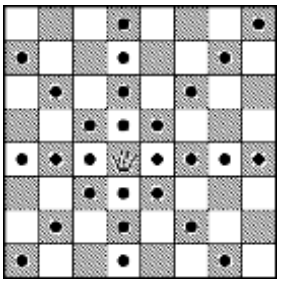
**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## (270202/280202)
## LIST OF SKILL BASED MINI PROJECT

1. Write a program to implement King Travails on the standard 8x8 chess board. (The king moves one square in any direction, horizontally, vertically, or diagonally.)



2. Write a program to implement Queen Travails on the standard 8x8 chess board. (The queen may move in any straight line, horizontal, vertical, or diagonal.)



3. Implement the Phone directory application using doubly-linked lists.
4. Design and solve any puzzles with only one solution, such as mazes. (DFS can be adapted to find all solutions to a maze by only including nodes on the current path in the visited set.)
5. Write a program to evaluate any arithmetic expressions using STACK.
6. Write a program to implement priority queue for airport check in process.

---

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY (270203/280203)

## LIST OF PROGRAMS

1. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.

2. WAP that uses a class where the member functions are defined outside a class.

3. WAP to find the greater of two given numbers in two different classes using friend function.

4. 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.

5. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.

6. WAP to define the function template for calculating the square of given numbers with different data types.

7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.

8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

9. WAP Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.

10. WAP to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY (270203/280203)
## LIST OF SKILL BASED MINI PROJECTS

1. Using C++ OOP Program, create a billing system for the book inventory system.
2. Implement a shopping cart for any shop using C++ OOP Program
3. Using C++ OOP Program, develop an authentication system for login and registration of system.
4. Using C++ OOP Program, design a pattern matching mechanism for credit fraud detection system.
5. Implement the leave management for payroll management Using C++ OOP Program.
6. Demonstrate the overall mechanism for managing contact in any directory Using C++ OOP Program
7. Implement the analog and digital clock using C++ OOP Program.
8. Design a diary for maintaining personal & appointment details using C++ OOP Program.
9. Develop a module for designing a student report card using C++ OOP Program.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - XIV**

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

***[ITEM IT - 18]***

# 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. II 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.** | 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** | **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 | | | | 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 % |

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# 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)

## 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 | | | | | | | | | |
| | | | | End Term Evaluation | | Continuous Evaluation | | End Sem. Exam. | Continuous Evaluation | | | L | T | P | | | |
| | | | | End Sem. Exam. | $Proficiency in subject /course | Mid Sem. Exam. | Quiz/ Assign ment | | 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 | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|
| 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% | 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)

## 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/ Assign ment | | 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 | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|
| 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% | Credits % |

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## 160211/230202

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | 2 | 4 |

## COURSE OBJECTIVES

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

---

**Unit-I**

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

**Unit-II**

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

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

**Unit-III**

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

**Unit-IV**

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

**Unit-V**

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

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**RECOMMENDED BOOKS**

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

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## COURSE OUTCOMES

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

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

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

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

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

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

CO6. design the optimal algorithmic solutions for various problems.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DIGITAL LOGIC DESIGN
## 230201

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | - | 3 |

## COURSE OBJECTIVES

- To understand the fundamental operating components of Digital Computers
- To learn various number systems, boolean algebra employed in digital computers
- To understand the concept of counters, latches and flip-flops.

---

**Unit-I**

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

**Unit-II**

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

**Unit-III**

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Programmable Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL).

**Unit-IV**

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

**Unit-V**

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential (or simple)

programmable logic device (SPLD), Complex programmable logic device (CPLD), Field-programmable gate array (FPGA), Digital Logic Design: Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

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**RECOMMENDED BOOKS**

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

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## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the basic components and functional units to define computer architecture
CO2. explain different number systems and basic operations employed at machine level.
CO3. develop the understanding of combinational circuits.
CO4. analyse the basic concept of sequential circuits.
CO5. compare and differentiate various memories used in Computers.
CO6. reduce the Boolean functions to mitigate hardware complexity issues.

---

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
## 160212 /230203

| L | T | P | Total Credits |
|---|---|---|---|
| 3 | - | 2 | 4 |

## COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

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**Unit-I**

**Introduction to C++ and Object Oriented Concepts:** Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

**Programming Techniques:** Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

**Unit-II**

**Classes & Objects:** Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

**Constructors and Destructors:** Introduction, Types of Constructors- Default Constructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

**Unit-III**

**Polymorphism:** Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary

Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

**Unit-IV**

**Inheritance:** Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

**Unit-V**

**Pointer & File Concept:** Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

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**RECOMMENDED BOOKS**


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


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## COURSE OUTCOMES

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

CO1. tell the concepts of classes & objects and their significance in real world.

CO2. explain the benefits of object oriented design.

CO3. build C++ classes using appropriate encapsulation and design principles.

CO4. analyze the utilization of inheritance and polymorphism in the solution of problems.

CO5. choose appropriate object orient programming concepts for solving real world problems.

CO6. develop solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DIGITAL ELECTRONICS
## 160213 (DC-3)

| L | T | P | Total Credits |
|---|---|---|---|
| 2 | 1 | - | 3 |

## COURSE OBJECTIVES

- To understand the fundamental operating components of Digital Computers
- To learn various number systems, boolean algebra employed in digital computers
- To understand the concept of counters, latches and flip-flops.

---

**Unit-I**

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

**Unit-II**

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

**Unit-III**

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Programmable Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL).

**Unit-IV**

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

**Unit-V**

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential (or simple)

programmable logic device (SPLD), Complex programmable logic device (CPLD), Field-programmable gate array (FPGA), Digital Logic Design: Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

---

**RECOMMENDED BOOKS**

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---

## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the basic components and functional units to define computer architecture
CO2. explain different number systems and basic operations employed at machine level.
CO3. develop the understanding of combinational circuits.
CO4. analyse the basic concept of sequential circuits.
CO5. compare and differentiate various memories used in Computers.
CO6. reduce the Boolean functions to mitigate hardware complexity issues.

---

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

**ANNEXURE - XV**

# *List of Experiments and Skill Based Mini Projects of Laboratory Courses*

## *B. Tech II Semester*

## *(Batch Admitted in 2021-22)*

## *(Information Technology/ Internet of Things (IoT) / Artificial Intelligence and Robotics)*

## *Under Flexible Curriculum*

***[ITEM IT - 19]***

# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## (160211/230202)
## LIST OF EXPERIMENTS

1. Write a program for implementing the following sorting methods to arrange a list of integers in ascending order:
   - **a.** Selection sort
   - **b.** Quick sort
   - **c.** Merge sort
2. Write a program to implement Stack using array.
3. Write a program to count the number of nodes in the binary search tree.
4. Write a program to implement stack using linked list.
5. Write a program to implement AVL Tree.
6. Write a program to implement Breadth First Search and Depth First Search.
7. Write a program to implement graph using array.
8. Write a program to implement Spanning Tree.
9. Write a program to implement Heap Sort.
10. Write a program to implement binary search algorithm.

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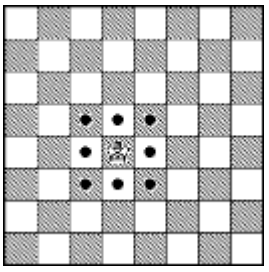
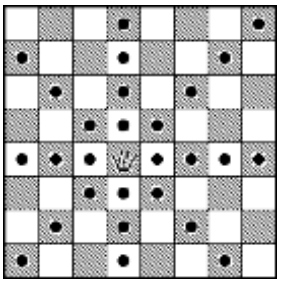
**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DATA STRUCTURES
## (160211/230202)
## LIST OF SKILL BASED MINI PROJECT

1. Write a program to implement King Travails on the standard 8x8 chess board. (The king moves one square in any direction, horizontally, vertically, or diagonally.)



2. Write a program to implement Queen Travails on the standard 8x8 chess board. (The queen may move in any straight line, horizontal, vertical, or diagonal.)



3. Implement the Phone directory application using doubly-linked lists.
4. Design and solve any puzzles with only one solution, such as mazes. (DFS can be adapted to find all solutions to a maze by only including nodes on the current path in the visited set.)
5. Write a program to evaluate any arithmetic expressions using STACK.
6. Write a program to implement priority queue for airport check in process.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY (160212/230203)

## LIST OF PROGRAMS

1. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.

2. WAP that uses a class where the member functions are defined outside a class.

3. WAP to find the greater of two given numbers in two different classes using friend function.

4. 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.

5. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.

6. WAP to define the function template for calculating the square of given numbers with different data types.

7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.

8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

9. WAP Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.

10. WAP to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## OBJECT ORIENTED PROGRAMMING AND METHODOLOGY (160212/230203)
## LIST OF SKILL BASED MINI PROJECTS

1. Using C++ OOP Program, create a billing system for the book inventory system.
2. Implement a shopping cart for any shop using C++ OOP Program
3. Using C++ OOP Program, develop an authentication system for login and registration of system.
4. Using C++ OOP Program, design a pattern matching mechanism for credit fraud detection system.
5. Implement the leave management for payroll management Using C++ OOP Program.
6. Demonstrate the overall mechanism for managing contact in any directory Using C++ OOP Program
7. Implement the analog and digital clock using C++ OOP Program.
8. Design a diary for maintaining personal & appointment details using C++ OOP Program.
9. Develop a module for designing a student report card using C++ OOP Program.

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

Department of Information Technology

**ANNEXURE - XVI**

# *Gaps in CO Attainment Levels for Session Jan-June 2021 & April-Sep. 2021 Semester and Proposed Corrective Measures for Improvement*

## *(Information Technology)*

***[ITEM - 20]***

**Madhav Institute of Technology and Science, Gwalior**
**(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)**
**Department of Information Technology**

## CO Attainment of B. Tech. Information Technology & Impact Analysis

### Session: Jan-Jun. 2021

| | Course | | Course outcomes | Direct | Level of | Indirect | Level of | Overall | Overall | Target | Target | Gap | Action Taken |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semester IV | 160403: Operating System | CO1 | I am able to tell the basic concept of operating systems. | 87.2 | 3.0 | 75.9 | 3.0 | 84.9 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | | CO2 | I am able to explain the working of operating system. | 92.8 | 3.0 | 70.4 | 3.0 | 88.3 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | | CO3 | I am able to develop the solution of various operating system problem | 97.6 | 3.0 | 72.2 | 3.0 | 92.5 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | | CO4 | I am able analyze the various operating system problems/issues. | 94.4 | 3.0 | 70.4 | 3.0 | 89.6 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | | CO5 | I am able to measure the performance of various scheduling/allocatio | 95.2 | 3.0 | 70.4 | 3.0 | 90.2 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | | CO6 | I am able to test the working of various scheduling/allocation approac | 94.4 | 3.0 | 70.4 | 3.0 | 89.6 | 3.00 | 70 | 3.0 | 0.0 | More HOT question should be added |
| | 160404: Computer System Organization | CO1 | Illustrate various number systems, Binay codes and its application in | 100 | 3.0 | 70 | 3.0 | 94.0 | 3 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | | CO2 | Identify the logic functions, circuits, truth tables and also apply the la | 89 | 3.0 | 70 | 3.0 | 85.2 | 3 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | | CO3 | Develop the formal procedures for the analysis and design of combina | 100 | 3.0 | 65 | 2.5 | 93.0 | 2.9 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | | CO4 | Analyse sequential circuit's components and their usability in digital | 78 | 3.0 | 70 | 3.0 | 76.4 | 3 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | | CO5 | Compare the concept of memories, programmable devices and digital | 80 | 3.0 | 74 | 3.0 | 78.8 | 3 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | | CO6 | Design and analyze circuits for digital arithmetic. | 73 | 3.0 | 68 | 2.8 | 72.0 | 2.96 | 65 | 2.5 | 0.0 | Assess through more HOTs questions |
| | 160402: Database management system | CO1 | Demonstrate the concepts of different type of database system. | 66.40 | 2.60 | 73.33 | 3.00 | 67.79 | 2.68 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO2 | Apply Relational algebra concepts to design database system. | 82.40 | 3.00 | 70.67 | 3.00 | 80.05 | 3.00 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO3 | Make use of queries to design and access database system. | 86.40 | 3.00 | 73.33 | 3.00 | 83.79 | 3.00 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO4 | Analyze the evaluation of transacti on processing and | 63.20 | 2.30 | 70.67 | 3.00 | 64.69 | 2.44 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO5 | Determine the optimize database for real world applications. | 83.20 | 3.00 | 69.33 | 2.90 | 80.43 | 2.98 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO6 | Design a database system for a real world application. | 87.20 | 3.00 | 69.33 | 2.90 | 83.63 | 2.98 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | 100005: Cyber Security | CO1 | I am able to Tell the basic terminologies of cyber security | 90.40 | 3.00 | 51.67 | 1.10 | 82.65 | 2.62 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO2 | I am able to Explain the basic concepts of Networking and Inte | 97.60 | 3.00 | 51.67 | 1.10 | 88.41 | 2.62 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO3 | I am able to Apply various methods used to protect data in the | 95.20 | 3.00 | 56.67 | 1.60 | 87.49 | 2.72 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO4 | I am able to Discover the Concepts of IP security and Architec | 95.20 | 3.00 | 61.67 | 2.10 | 88.49 | 2.82 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO5 | I am able to Compare various types of Cyber Security Threats/ | 98.40 | 3.00 | 53.33 | 1.30 | 89.39 | 2.66 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | | CO6 | I am able to Develop the understanding of Cyber Crime Invest | 92.00 | 3.00 | 60.00 | 2.00 | 85.60 | 2.80 | 60.00 | 2.00 | 0.0 | More HOT question should be added |
| | 160401:Design & Analysis of Algorithms | CO1 | tell the basic features of an algorithm. | 89.60 | 3.0 | 84.44 | 3.0 | 88.6 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | | CO2 | demonstrate a familiarity with major algorithms and data struct | 87.20 | 3.0 | 75.56 | 3.0 | 84.9 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | | CO3 | apply important algorithmic design paradigms and methods of | 89.60 | 3.0 | 77.78 | 3.0 | 87.2 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | | CO4 | analyze the asymptotic performance of algorithms. | 86.40 | 3.0 | 75.56 | 3.0 | 84.2 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | | CO5 | compare different design techniques to develop algorithms for | 93.60 | 3.0 | 77.78 | 3.0 | 90.4 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | | CO6 | design algorithms using greedy strategy, divide and conquer ap | 78.40 | 2.8 | 73.33 | 3.0 | 77.4 | 3.0 | 65 | 2.5 | 0.0 | More HOT Questions should be added |
| | 160401:Design & Analysis of Algorithms Lab | CO1 | I am able to relate the principles of algorithm design in solving | 88.00 | 3.0 | 74.67 | 3.0 | 85.3 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| | | CO2 | I am able to demonstrate basic algorithms and different proble | 72.00 | 3.0 | 69.33 | 2.9 | 71.5 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| | | CO3 | I am able to build creativeness and confidence to solve non-c ot | 64.00 | 3.0 | 73.33 | 3.0 | 65.9 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| | | CO4 | I am able to analyze running times of algorithms using asympt | 96.00 | 3.0 | 73.33 | 3.0 | 91.5 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| | | CO5 | I am able to compare various algorithm design approaches for | 92.00 | 3.0 | 70.67 | 3.0 | 87.7 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| | | CO6 | I am able to design and implement optimization algorithms in s | 72.00 | 3.0 | 69.33 | 2.9 | 71.5 | 3.0 | 60 | 2.0 | 0.0 | Increase the level of Programming and also increas |
| Semester VI | 160601: Compiler Design | CO1 | define the concepts of finite automata and context free grammar. | 91 | 3 | 73 | 3 | 87.4 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO2 | build the concept of working of compiler. | 92.8 | 3 | 75 | 3 | 89.2 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO3 | examine various parsing techniques and their comparison. | 98 | 3 | 76 | 3 | 93.3 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO4 | compare various code generation and code optimization techniques. | 74.4 | 3 | 76 | 3 | 74.7 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO5 | analyze different tools and techniques for designing a compiler. | 76.8 | 3 | 76 | 3 | 76.6 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO6 | design various phases of compiler. | 77 | 3 | 67 | 2 | 75.0 | 3 | 60 | 2 | 0.0 | Will conduct more addition classes. |
| | 160601: Compiler Design (LAB) | CO1 | define the concepts of finite automata and context free gram ma | 91 | 3 | 73 | 3 | 87.4 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO2 | build the concept of working of compiler. | 92.8 | 3 | 75 | 3 | 89.2 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO3 | examine various parsing techniques and their comparison. | 98 | 3 | 76 | 3 | 93.3 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO4 | compare various code generation and code optimization techni | 74.4 | 3 | 76 | 3 | 74.7 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO5 | analyze different tools and techniques for designing a compiler | 76.8 | 3 | 76 | 3 | 76.6 | 3 | 60 | 2 | 0.0 | Will increase higer order thinking question |
| | | CO6 | design various phases of compiler. | 77 | 3 | 67 | 2 | 75.0 | 3 | 60 | 2 | 0.0 | Will conduct more addition classes. |
| | 100007: Disaster Management | CO1 | Identify Disaster preventiona and mitigation approaches | 91.2 | 3.0 | 75.8 | 3.0 | 88.1 | 3.0 | 65 | 2.5 | 0.0 | More HOT Question should be included |
| | | CO2 | Classify global and national disasters , their trends and profiles | 99.2 | 3.0 | 78.8 | 3.0 | 95.1 | 3.0 | 65 | 2.5 | 0.0 | Target should be increased |
| | | CO3 | Determine the impact of various disasters | 90.4 | 3.0 | 72.7 | 3.0 | 86.9 | 3.0 | 65 | 2.5 | 0.0 | More HOT Question should be included |
| | | CO4 | Apply Disaster risk reduction in management | 92.8 | 3.0 | 72.7 | 3.0 | 88.8 | 3.0 | 65 | 2.5 | 0.0 | Target should be increased |
| | | CO5 | Infer the linkage between disasters , environment and developr | 98.4 | 3.0 | 75.8 | 3.0 | 93.9 | 3.0 | 65 | 2.5 | 0.0 | More HOT Question should be included |
| | | CO6 | Create Technological innovations in Disaster Risk Reduction: Advant | 65.2 | 2.5 | 72.3 | 3.0 | 66.6 | 2.6 | 65 | 2.5 | 0.0 | More HOT Question should be included |
| | 160611: Networks & web security | CO1 | Explain the basic concepts of switching and finite automata theory an | 97 | 3.0 | 89 | 3.0 | 95.216 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO2 | Relate practical problems to languages, automata, computability, and | 78.4 | 3.0 | 81.48 | 3.0 | 79.016 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO3 | Construct abstract models of computing and analyse their power to re | 99 | 3.0 | 85 | 3.0 | 96.396 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO4 | Construct and analyze the grammar. | 74 | 3.0 | 85 | 3.0 | 76.52 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO5 | Apply mathematical models and descri ptors in various computing the | 67.2 | 2.7 | 85 | 3.0 | 70.76 | 3.0 | 65 | 2.5 | 0.0 | Arrangement of Remedial Classes |
| | | CO6 | Solve problems in computer science using mathematical and formal t | 86.4 | 3.0 | 74 | 3.0 | 83.92 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | 900108: Software Engineering | CO1 | List various software models with respect to their accuracy and needs | 92.6 | 3.0 | 74.67 | 3.0 | 89.014 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO2 | Explain the real world problems using software engineering conc epts | 81.6 | 3.0 | 69.33 | 2.9 | 79.146 | 2.9 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO3 | Develop the technique and results with customer expectations. | 91.2 | 3.0 | 69.3 | 2.9 | 86.826 | 2.9 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO4 | Identify and how to use various cost estimation techni ques used in so | 96.8 | 3.0 | 77.3 | 3.0 | 92.906 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO5 | Compare design of a system, component, or process to meet desired n | 99.2 | 3.0 | 68.0 | 2.8 | 92.96 | 2.8 | 65 | 2.5 | 0.0 | Conducted Extra sessions on Tutorial problems |
| | | CO6 | Develop the techniques, skills and software engineering tools ne cessa | 57.6 | 1.7 | 74.6 | 3.0 | 61 | 3.0 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | 160613: Cloud Computing | CO1 | Define various basic concepts related to cloud computing | 97 | 3.0 | 89 | 3.0 | 95.216 | 3 | 65 | 2.5 | 0.0 | level of questions improved for more COs |
| | | CO2 | Identify the architecture, infrastructure and delivery models of | 78.4 | 3.0 | 81.48 | 3.0 | 79.016 | 3 | 65 | 2.5 | 0.0 | level of questions improved for more COs |
| | | CO3 | Apply suitable virtualization conce pt | 99 | 3.0 | 85 | 3.0 | 96.396 | 3 | 65 | 2.5 | 0.0 | level of questions improved for more COs |
| | | CO4 | Choose the appropriate programming models and approach | 74 | 3.0 | 85 | 3.0 | 76.52 | 3 | 65 | 2.5 | 0.0 | level of questions improved for more COs |
| | | CO5 | Analyse various security issues in cloud computing | 67.2 | 2.7 | 85 | 3.0 | 70.76 | 2.76 | 65 | 2.5 | 0.0 | Discussed for achieved more direct COs |
| | | CO6 | Compose virtualization, security and programming module in | 86.4 | 3.0 | 74 | 3.0 | 83.92 | 3 | 65 | 2.5 | 0.0 | level of questions improved for more COs |
| | 160602: Computer Networks | CO1 | explain the fundamental concepts of computer network. | 91.2 | 3.0 | 72.5 | 3.0 | 87.4528 | 3 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO2 | illustrate the basic taxonomy & terminologies of computer network p | 69.6 | 2.9 | 73.9 | 3.0 | 70.4626 | 2.92 | 65 | 2.5 | 0.0 | Discussed extra Tutorial- sheets |
| | | CO3 | develop a concept for understanding advance computer network. | 67.2 | 3.0 | 72.5 | 3.0 | 68.2528 | 3 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO4 | build the skill of IP addressing and routing mechanism. | 85.6 | 3.0 | 72.5 | 3.0 | 82.9728 | 3 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO5 | predict the performance of computer network in congestion and intern | 91.2 | 3.0 | 71.0 | 2.3 | 87.1629 | 2.8676 | 65 | 2.5 | 0.0 | More HOT questions should be added |
| | | CO6 | construct the network environment for implementation of computer n | 60.0 | 2.0 | 72.5 | 3.0 | 62.4928 | 2.2 | 65 | 2.5 | 0.3 | Proper coverage & assignment of COs in the questi |

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**Department of Information Technology**

## CO Attainment of B. Tech. IT (First year)

### Session: APRIL-SEP 2021

| | Course Name | | Course outcomes | Direct Attainment % | Level of Direct Attainment | Indirect Attainment % | Level of Indirect Attainment | Overall Attainment % | Overall level of Attainment | Target | Target of level | Gap | Action Taken |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B.Tech. IT (Semester II ) | 160211: Data Structures | CO1 | of algorithms a | 71.2 | 3 | 80.66 | 3 | 73.092 | 3 | 60 | 2 | 0 | More HOT Questions should be added |
| | | CO2 | orking of linear | 77.6 | 3 | 91.66 | 3 | 80.412 | 3 | 60 | 2 | 0 | More HOT Questions should be added |
| | | CO3 | priate data struc | 76 | 3 | 77 | 3 | 76.2 | 3 | 60 | 2 | 0 | More HOT Questions should be added |
| | | CO4 | nce of various d | 72 | 3 | 80.66 | 3 | 73.732 | 3 | 60 | 2 | 0 | More HOT Questions should be added |
| | | CO5 | nplexities of va | 86.6 | 3 | 80.66 | 3 | 85.412 | 3 | 60 | 2 | 0 | More HOT Questions should be added |
| | | CO6 | al algorithmic s | 64 | 2.4 | 69.66 | 2.9 | 65.132 | 2.5 | 60 | 2 | 0 | More HOT Questions should be added |
| | 160212:Object Oriented Programming and Methodology | CO1 | & object and th | 55.0 | 1.5 | 69.0400 | 2.9 | 57.808 | 1.8 | 65 | 2.5 | 0.7 | Remedial classes should be conducted |
| | | CO2 | nefit of object o | 77.6 | 3.0 | 71.4200 | 3.0 | 76.364 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO3 | propriate encap | 36.8 | | 64.2800 | 2.4 | 42.296 | 3.0 | 65 | 2.5 | 0 | Some LOT questions should be included |
| | | CO4 | nce and polymo | 81.6 | 3.0 | 66.6600 | 2.6 | 78.612 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO5 | programming s | 52.0 | 1.2 | 64.2800 | 2.4 | 54.456 | 3.0 | 65 | 2.5 | 0 | Remedial classes should be conducted |
| | | CO6 | control structure | 36.0 | | 64.2800 | 2.4 | 41.656 | 2.6 | 65 | 2.5 | 0 | Some LOT questions should be included |
| | 160212 : Object oriented Programming & Methodology (LAB) | CO1 | onal and string | 76.0 | 3.0 | 74.6600 | 3.0 | 75.732 | 3.0 | 65 | 2.5 | 0 | Remedial classes should be conducted |
| | | CO2 | as OOPS concep | 52.0 | 1.2 | 78.6600 | 3.0 | 57.332 | 1.7 | 65 | 2.5 | 0.8 | Remedial classes should be conducted |
| | | CO3 | to buid a reliab | 56.0 | 1.6 | 74.6600 | 3.0 | 59.732 | 1.9 | 65 | 2.5 | 0.6 | Some LOT questions should be included |
| | | CO4 | icated problems | 72.0 | 3.0 | 73.3300 | 3.0 | 72.266 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO5 | as and when re | 68.0 | 2.8 | 69.3300 | 2.9 | 68.266 | 2.8 | 65 | 2.5 | 0 | Remedial classes should be conducted |
| | | CO6 | vrite class and i | 72.0 | 3.0 | 72.0000 | 3.0 | 72 | 3.0 | 65 | 2.5 | 0 | Some LOT questions should be included |
| | 160213:Digital Electronics | CO1 | for defining ba | 60 | 2 | 84 | 3 | 57.808 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| | | CO2 | em and solve th | 55 | 2 | 81 | 3 | 76.364 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| | | CO3 | standing of com | 60 | 2 | 86 | 3 | 42.296 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| | | CO4 | ic concept of se | 58 | 2 | 87 | 3 | 78.612 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| | | CO5 | are various mem | 43 | 1 | 86 | 3 | 54.456 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| | | CO6 | ean functions us | 55 | 2 | 83 | 3 | 41.656 | 3 | 60 | 2 | 0 | Conduct more addition class with higher order thinking question |
| B.Tech. IOT (Semester II ) | 230201: Digital Logic Design | CO1 | s, Binay codes a | 77.6 | 3.0 | 63.8 | 2.3 | 73.092 | 2.86 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO2 | so apply the law | 82.4 | 3.0 | 74.0 | 3.0 | 80.412 | 3 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO3 | r the analysis an | 72.8 | 3.0 | 68.2 | 2.8 | 76.2 | 2.96 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO4 | mponents and t | 90.4 | 3.0 | 65.3 | 2.5 | 73.732 | 2.9 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO5 | hories, program | 70.4 | 3.0 | 60.9 | 2.0 | 85.412 | 2.8 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO6 | yze circuits for | 70.4 | 2.8 | 79.7 | 3.0 | 65.132 | 2.84 | 65 | 2.5 | 0 | More HOT questions should be added |
| | 230203: Object oriented Programming & Methodology | CO1 | & object and th | 46.4 | 3.0 | 83.3300 | 2.9 | 53.8 | 1.3 | 65 | 2.5 | 1.2 | Remedial classes should be conducted |
| | | CO2 | nefit of object o | 80.0 | 3.0 | 75.0000 | 3.0 | 79.0 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO3 | propriate encap | 89.6 | 3.0 | 75.0000 | 2.4 | 86.7 | 3.0 | 65 | 2.5 | 0 | Some HOT questions must be included |
| | | CO4 | nce and polymo | 77.6 | 3.0 | 77.7700 | 2.6 | 77.6 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO5 | programming s | 50.4 | 1.0 | 66.6600 | 2.4 | 53.7 | 1.3 | 65 | 2.5 | 1.2 | Remedial classes should be conducted |
| | | CO6 | Develop | 86.4 | 3.0 | 58.3300 | 2.4 | 80.8 | 3.0 | 65 | 2.5 | 0 | Target should be increased |
| | 230203: Object oriented Programming & Methodology Lab | CO1 | Select proper an | 68.0 | 2.8 | 86.1100 | 3.0 | 71.6 | 3.0 | 65 | 2.5 | 0 | More HOTquestion should be included |
| | | CO2 | Demostrate the | 60.0 | 2.0 | 80.5500 | 3.0 | 64.1 | 2.4 | 65 | 2.5 | 0.1 | Remedial classes should be conducted |
| | | CO3 | Apply validatio | 68.0 | 2.8 | 80.5500 | 3.0 | 70.5 | 3.0 | 65 | 2.5 | 0 | More HOTquestion should be included |
| | | CO4 | Analyze and wr | 72.0 | 3.0 | 83.3300 | 3.0 | 74.3 | 3.0 | 65 | 2.5 | 0 | More HOTquestion should be included |
| | | CO5 | Choose appropr | 72.0 | 3.0 | 66.6600 | 2.6 | 70.9 | 3.0 | 65 | 2.5 | 0 | More HOTquestion should be included |
| | | CO6 | Construct a | 60.0 | 2.0 | 58.3300 | 1.8 | 59.7 | 1.9 | 65 | 2.5 | 0.6 | Remedial classes should be conducted |
| | 230202:Data Structures | CO1 | gorithms and th | 68 | 2.8 | 87.0 | 3.0 | 57.808 | 2.84 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO2 | of linear and non | 75.2 | 3.0 | 85.5 | 3.0 | 76.364 | 3 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO3 | ata structure to s | 64.8 | 2.5 | 82.6 | 3.0 | 42.296 | 2.584 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO4 | various data str | 60 | 2.0 | 89.9 | 3.0 | 78.612 | 2.2 | 65 | 2.5 | 0.3 | More assignement will be given |
| | | CO5 | ities of various | 60 | 2.0 | 85.5 | 3.0 | 54.456 | 2.2 | 65 | 2.5 | 0.3 | Proper coverage & assignment of COs in the question paper is requ |
| | | CO6 | orithmic solutio | 63.2 | 2.3 | 82.6 | 3.0 | 41.656 | 2.456 | 65 | 2.5 | 0.044 | Remedial classes will be taken |
| B.Tech. AIR (Semester II ) | 230203:Object oriented Programming & Methodology | CO1 | & object and th | 46.4 | | 83.3300 | 2.9 | 53.8 | 1.3 | 65 | 2.5 | 1.2 | Remedial classes should be conducted |
| | | CO2 | nefit of object o | 80.0 | 3.0 | 75.0000 | 3.0 | 79.0 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO3 | propriate encap | 89.6 | 3.0 | 75.0000 | 2.4 | 86.7 | 3.0 | 65 | 2.5 | 0 | Some HOT questions must be included |
| | | CO4 | nce and polymo | 77.6 | 3.0 | 77.7700 | 2.6 | 77.6 | 3.0 | 65 | 2.5 | 0 | No action Required |
| | | CO5 | programming s | 50.4 | 1.0 | 66.6600 | 2.4 | 53.7 | 1.3 | 65 | 2.5 | 1.2 | Remedial classes should be conducted |
| | | CO6 | control structure | 86.4 | 3.0 | 58.3300 | 2.4 | 80.8 | 3.0 | 65 | 2.5 | 0 | Target should be increased |
| | 230202:Data Structure | CO1 | gorithms and the | 73.6 | 3.0 | 87.0300 | 3.0 | 76.3 | 3.00 | 65 | 2.5 | 0 | No action required |
| | | CO2 | of linear/Non L | 72.8 | 3.0 | 81.4800 | 3.0 | 74.5 | 3.00 | 65 | 2.5 | 0 | No action required |
| | | CO3 | data structure to | 57.6 | 1.7 | 81.4800 | 3.0 | 62.4 | 2.20 | 65 | 2.5 | 0.3 | Remedial classes should be conducted |
| | | CO4 | various Data St | 32.8 | 0.0 | 83.3300 | 3.0 | 42.9 | 0.00 | 65 | 2.5 | 2.5 | Some LOT question should be added |
| | | CO5 | ties of various d | 61.6 | 2.1 | 70.3700 | 3.0 | 63.4 | 2.30 | 65 | 2.5 | 0.2 | Remedial classes should be conducted |
| | | CO6 | design the | 66.4 | 2.6 | 61.1100 | 2.1 | 65.3 | 2.50 | 65 | 2.5 | 0 | Some HOT question should be added |
| | 230202:Data Structure Lab | CO1 | Select proper an | 56.0 | 1.6 | 88.8800 | 3.0 | 62.6 | 2.20 | 65 | 2.5 | 0.3 | Remedial classes should be conducted |
| | | CO2 | Demostrate the | 60.0 | 2.0 | 86.1100 | 3.0 | 65.2 | 2.50 | 65 | 2.5 | 0 | No action required |
| | | CO3 | Apply validatio | 72.0 | 3.0 | 86.1100 | 3.0 | 74.8 | 3.00 | 65 | 2.5 | 0 | Some HOT question should be added |
| | | CO4 | Analyze and wr | 84.0 | 3.0 | 83.3300 | 3.0 | 83.9 | 3.00 | 65 | 2.5 | 0 | Some HOT question should be added |
| | | CO5 | Choose appropr | 72.0 | 3.0 | 72.2200 | 3.0 | 72.0 | 3.00 | 65 | 2.5 | 0 | Some HOT question should be added |
| | | CO6 | Construct a | 64.0 | 2.4 | 61.1100 | 2.1 | 63.4 | 2.30 | 65 | 2.5 | 0.2 | Remedial classes should be conducted |
| | 230201: Digital Logic Design | CO1 | s, Binay codes a | 88 | 3.0 | 84 | 3.0 | 87.2 | 3 | 65 | 2.5 | 0 | Proper coverage & assignment of COs in the question paper is requ |
| | | CO2 | so apply the law | 72 | 3.0 | 83 | 3.0 | 74.2 | 3 | 65 | 2.5 | 0 | Discussed extra Tutorial- sheets |
| | | CO3 | r the analysis an | 64 | 2.4 | 86 | 3.0 | 68.4 | 2.52 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO4 | mponents and t | 96 | 3.0 | 86 | 3.0 | 94 | 3 | 65 | 2.5 | 0 | Proper coverage & assignment of COs in the question paper is requ |
| | | CO5 | hories, program | 92 | 3.0 | 83 | 3.0 | 90.2 | 3 | 65 | 2.5 | 0 | More HOT questions should be added |
| | | CO6 | yze circuits for | 72 | 3.0 | 84 | 3.0 | 74.4 | 3 | 65 | 2.5 | 0 | Discussed extra Tutorial- sheets |

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - XVII**

# *Curricula Feedback from Various Stakeholders for January - June 2021 & April – September 2021 Semester*

## *(Information Technology)*

***[ITEM IT - 21]***

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## Analysis Report of Feedback on Course Curriculum Collected from various Stakeholders

| S. No. | Feedback Report |
|---|---|
| 1 | COURSE CURRICULUM FEEDBACK (December 2020 to March 2021) |
| 2 | COURSE CURRICULUM FEEDBACK (January 2021 to June 2021) |
| 3 | COURSE CURRICULUM FEEDBACK (April 2021 to July 2021) |
| 4 | ALUMNI FEEDBACK ( Batch 2017 -2021) |
| 5 | EMPLOYER FEEDBACK |

## Session wise analysis and impact report: December 2020 to March 2021

- Based on the feedback data received from total 143 students and 11 faculty members (First semester- IT, IT (AIR), IT(IoT) & M. Tech) for the academic session December 2020 to March 2021, following points have been analysed:
- It has been observed that, in first semester 21.75% of students are strongly agreed, 38.65% of students are agreed, 28.98% of students are neutral, 10.3% of students are disagreed and only 0.2% of students are strongly disagreed with the syllabus/ content that they have studied in the first semester.
- Students have suggested to add Microcontrollers, web development, GIT hub and Python. (These subjects are already the part of curriculum in higher semesters)
- Some students has suggested to remove EEES from their curriculum as it is not the technical subject and not required in future prospective.
- It has been observed that, in first semester 41.8% of faculty members are strongly agreed, 45.632% of faculty members are agreed, and 12.726% of faculty members are neutral with the syllabus/ content that they have taught in the first semester.

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## COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 14 (Avg.)

| Dec 2020 -March 2021 | Student Feedback (comments) | | Response to student comments / Analysis | Remarks |
|---|---|---|---|---|
| **EEES –IT(100015)** | Microcontrollers, web devlopment, GIT hub | microcontrollers | These topics are already a part of higher semester subjects. On introductory level it is running in I sem. in IT (IoT) | (10) Is any new course required to meet current needs? |
| **EEES –AIR(100015)** | Technical English | DLD | Both subjects are required. Technical English is the backbone of communication an DLD is the fundamental for other subjects. | (8) Mention the course / contents which in your opinion is outdated & needs to be removed. |
| **ICP_230102 (IoT)** | Technical English is need to be removed/ Python | all courses are updated/ AI & Robotics | The subject is already a part of curriculum and offered in higher semesters. | (8) Mention the course / contents which in your opinion is outdated & needs to be removed./<br>(9) Name course / contents which needs to be updated./<br>(2) (ii) Minor specialization: |
| **ICP_230102** | More question are required to practice | Web development and cyber security | For practice, no. of programmes will be added. Mini skill project associated with practical subjects enhance think & design capability. | (10) Is any new course required to meet current needs?<br>(1) (i) Honours:/<br>(2) (ii) Minor specialization:/<br>(3) (III) Departmental electives: |
| **MT_Distributedcomputing_620112** | Cloud Computing | Operating Systems | Cloud Computing is the part of curriculum, run through Swayam/ NPTEL. | (10) Is any new course required to meet current needs?<br>(2) (ii) Minor specialization: |
| **MT_Mobile computing and ecommerce_620114** | Wireless communication | | It is expected from the PG students to have basic knowledge. Also the introduction is given before starting any advance subject. | (2) (ii) Minor specialization: |
| **Link:** | https://drive.google.com/drive/folders/141VO5x4C_C-5Q_sRunA02trwTsvz5OAu?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. | | | |
| | ICP is very important subject, It is the fundamental of programming. | | | |
| | Mobile Computing & M- Commerce and Database Systems are the important subjects as the fundamental subjects have already covered in B. Tech. In present scenario, knowledge of database is required in every sector.<br>What's need to be updated, will discuss with the students. | | | |

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| Parameter (Avg. Grading) / Subjects | 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(IoT) Energy, environment, Ecology and Society (06) | 4.00 | 4.00 | 5.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| 100015(IT) Energy, environment, Ecology and Society (04) | 4.25 | 4.00 | 4.00 | 3.75 | 3.50 | 3.75 | 4.00 |
| 100015(AIR) Energy, environment, Ecology and Society (15) | 3.53 | 3.33 | 3.40 | 3.60 | 3.47 | 3.47 | 3.40 |
| 230101(IoT) Introduction to Internet of Things (07) | 3.40 | 3.50 | 3.90 | 3.40 | 3.60 | 3.50 | 3.40 |
| 230102(IoT) Introduction to Computer programming (38) | 3.59 | 3.49 | 3.27 | 3.16 | 3.51 | 3.57 | 3.59 |
| 230102(AIR) Introduction to Computer programming (61) | 3.92 | 3.83 | 3.60 | 3.63 | 3.85 | 3.87 | 3.98 |
| 620111 Database Systems (03) | 3.67 | 3.67 | 3.33 | 3.67 | 3.67 | 3.00 | 3.00 |
| 620112 Distributed Computing (04) | 3.75 | 4.00 | 4.25 | 4.50 | 4.25 | 4.25 | 4.25 |
| 620113 High Speed Networks (03) | 4.25 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 |
| 620114 Mobile Computing & M- Commerce (02) | 3.00 | 3.00 | 2.50 | 2.50 | 3.00 | 3.00 | 2.00 |
| 620120 Machine Learning Using Python (02) | 4.00 | 3.50 | 3.50 | 3.00 | 4.50 | 4.50 | 4.00 |
| **Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average** | | | | | | | |

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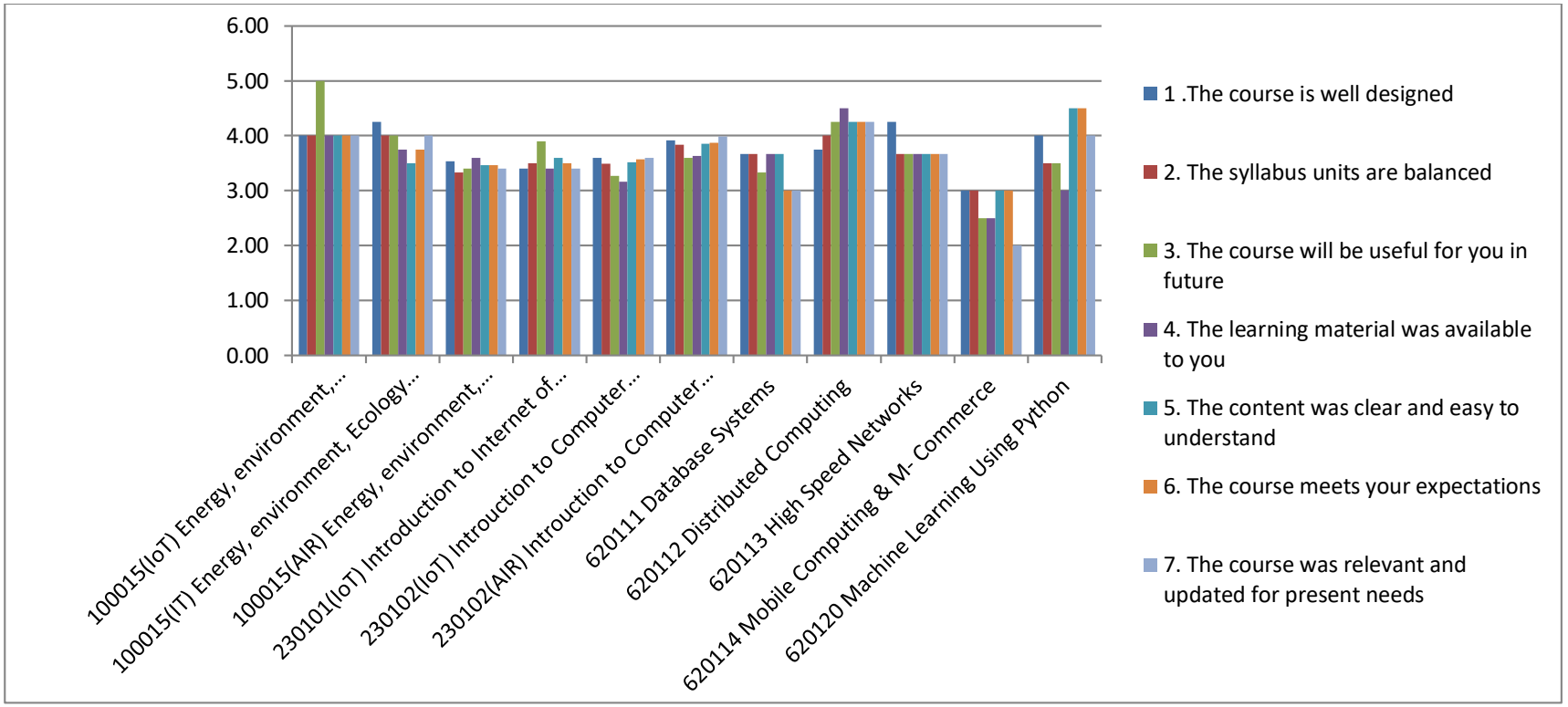


| Subject Code | Subject Name | Faculty Name | Strongly Agree in % | Agree in % | Neutral in % | Disagree in % | Strongly disagree in % |
|---|---|---|---|---|---|---|---|
| 100015(IoT) | Energy, environment, Ecology and Society | Prof. Shweta Patel | 14.28 | 45.23 | 28.57 | 11.9 | 0 |
| 100015(IT) | Energy, environment, Ecology and Society | Prof. Shweta Patel | 7.14 | 75 | 17.85 | 0 | 0 |
| 100015(AIR) | Energy, environment, Ecology and Society | Prof. Shweta Patel | 20.9 | 31.42 | 26.66 | 20.28 | 0 |
| 230101(IoT) | Introduction to Internet of Things | Prof. Vikas Sejwar | 14.14 | 75 | 10.85 | 0 | 0 |
| 230102(IoT) | Introuction to Computer programming | Dr. Sanjiv Sharma | 19.69 | 27.79 | 32.81 | 17.76 | 1.93 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 230102(AIR) | Introuction to Computer programming | Prof. Punit Johari | 27.38 | 33.8 | 31.9 | 6.42 | 0.4 |
| 620111 | Database Systems | Prof. Vishwas Shrivastava | 23.8 | 9.52 | 52.38 | 14.28 | 0 |
| 620112 | Distributed Computing | Prof. Rajeev K. Singh | 42.85 | 32.14 | 25 | 0 | 0 |
| 620113 | High Speed Networks | Prof. Namrata Agrawal | 33.33 | 66.66 | 0 | 0 | 0 |
| 620114 | Mobile Computing & M- Commerce | Prof. Santosh Sahu | 0 | 0 | 71.42 | 28.57 | 0 |
| 620120 | Machine Learning Using Python | Prof. Dheeraj Gurjar | 35.71 | 28.57 | 21.42 | 14.28 | 0 |
| on average % | | | 21.74727273 | 38.64818182 | 28.98727273 | 10.31727273 | 0.2118181818 |

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## 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-learnin g materials. |
| | ICP is the fundamental subject, basic and core subjects are covered here. Gradually the level and new concepts of programming has incorporated in higher semesters. |

| | 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) |
|---|---|---|---|---|---|
| 100015(IT)/100015(IoT)/100015(AIR) Energy, Environment, Ecology and Society | 3 | 4 | 4 | 4 | 4 |
| 230102(IT) Introduction to Computer programming | 4 | 4 | 5 | 5 | 5 |
| 230101(AIR) Introduction to Artificial Intelligence | 5 | 5 | 5 | 4 | 5 |
| 230102(AIR) Introduction to Computer programming | 5 | 5 | 5 | 5 | 5 |
| 230101(IoT) Introduction to Internet of Things | 5 | 5 | 4 | 5 | 4 |
| 230102(IoT) Introduction to Computer programming | 3 | 3 | 4 | 3 | 4 |
| 620111 Database Systems | 5 | 5 | 5 | 5 | 5 |
| 620112 Distributed Computing | 3 | 4 | 4 | 4 | 4 |
| 620113 High-Speed Networks | 3 | 4 | 4 | 4 | 4 |
| 620114 Mobile Computing & M-Commerce | 5 | 4 | 5 | 4 | 4 |
| 620120 Machine Learning Using Python | 4 | 4 | 4 | 4 | 3 |
| **Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)** | | | | | |

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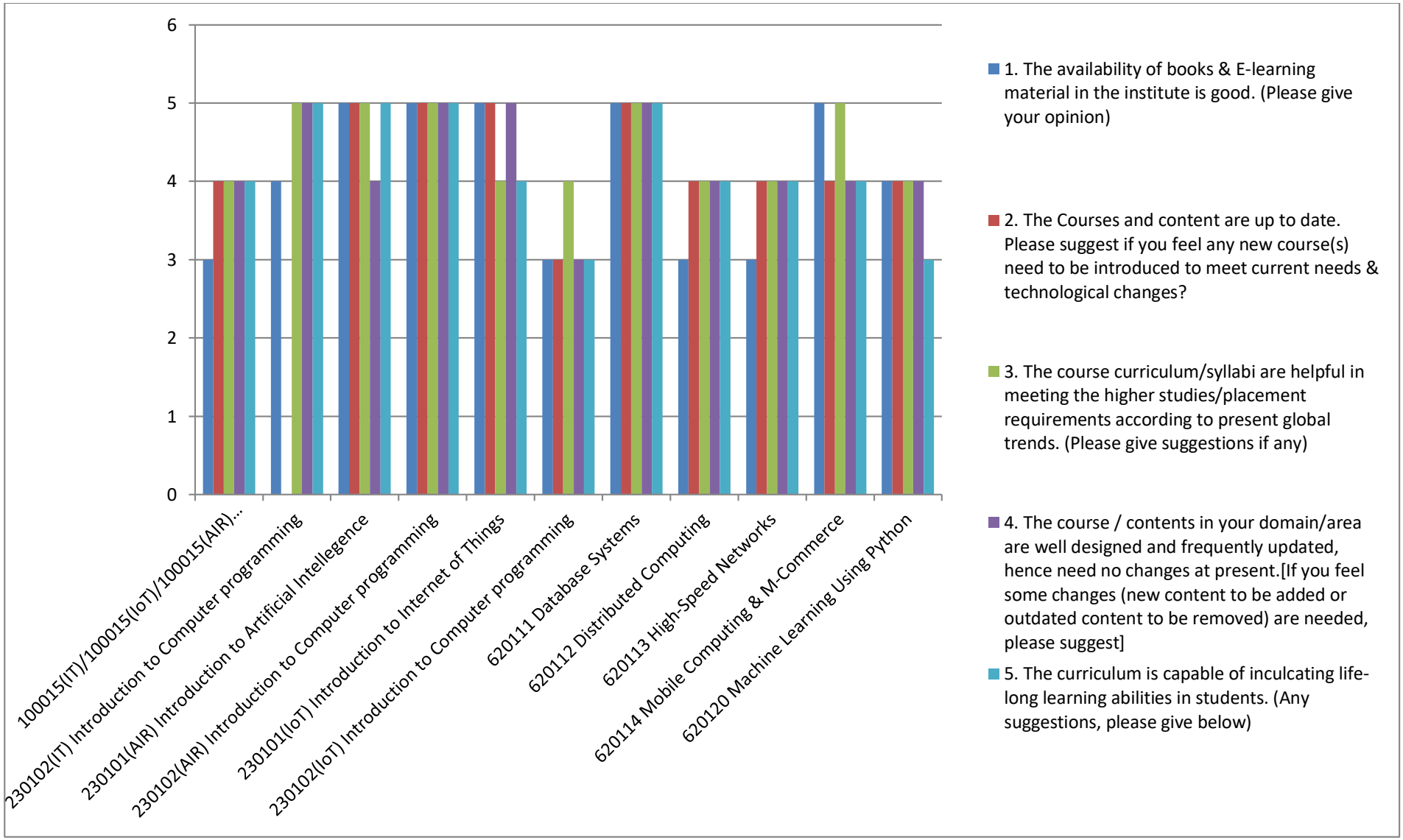

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| Q. No. | Curriculum Evaluation Point | Response in % | | | | |
|---|---|---|---|---|---|---|
| | | Strongly Agree | Agree | Neutral | Disagree | Strongly disagree |
| 1 | The availability of books & E-learning material in the institute is good | 45.45 | 28.18 | 27.27 | 0 | 0 |
| 2 | The Courses and content are up to date. | 45.45 | 45.45 | 9.09 | 0 | 0 |
| 3 | The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. | 45.45 | 54.54 | 0 | 0 | 0 |
| 4 | The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present. | 36.36 | 54.54 | 9.09 | 0 | 0 |
| 5 | The curriculum is capable of inculcating life-long learning abilities in students. | 36.36 | 45.45 | 18.18 | 0 | 0 |
| | Average | 41.814 | 45.632 | 12.726 | 0 | 0 |

*******

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## Session wise analysis and impact report: January to June 2021

Based on the feedback data received from total 177 students and 12 faculty members (Fourth Semester & Sixth Semester- IT & Second Semester M. Tech) for the academic session January 2021 to June 2021, following points have been analysed:

- It has been observed that, students of Fourth Semester & Sixth Semester- B. Tech IT and Second Semester M. Tech are 27.38% strongly agreed, 29.63% are agreed, 32.04% are neutral, 9.94% are disagreed and only 0.926% are strongly disagreed with the syllabus/ content that they have studied in the first semester.
- Students have suggested to add Introduction to mongodb and other technologies relate to database that helps in project development. Points are noted.
- Some students has suggested to add Cloud computing, AI & ML and Cyber security as a part of their curriculum. (These subject are already added as a part of their higher semesters).
- It has been observed that, in above mentioned semester 53.328% of faculty members are strongly agreed, 43.328% of faculty members are agreed, and 3.332% 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: 18 (Avg.)**

| January-June 2021 | Student Feedback (Comments) | Response to student comments / Analysis | Remarks |
|---|---|---|---|
| **160402 Database Management System** | Introduction to mongo db and other technologies | Students are free to use any technology (backend/front end/ database) while designing projects. Faculty members as mentors help them to learn. | Is any new course required to meet current needs? |
| **900116 (OC-1) Data Mining & Warehousing** | Cloud computing | This subject is already a part of curriculum. | (i) Honours: |
| | AI & ML | The subject is already a part of curriculum and offered in higher semesters. | (ii) Minor specialization: |
| | Cyber security | This subject is already a part of curriculum. | (iv) Open electives: |

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| | | |
|---|---|---|
| Link: | https://drive.google.com/drive/folders/1Q8Z-CYbxEEP4SgbKJo1w56gIwL63es31?usp=sharing | |
| **Action/ Taken ( threshold value 3.5 )**<br>160611 (DE-1) Network and web security | **Database Management System:** Units are well designed. More technologies may be added as a part of introduction | 6. The course meets your expectations<br>7. The course was relevant and updated for present needs |

| Parameter (Average Grading) / Subjects | 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 |
|---|---|---|---|---|---|---|---|
| **160401 Design & Analysis of Algorithm (14)** | 3.85 | 3.92 | 4.07 | 3.92 | 3.92 | 4 | 4 |
| **160402 Database Management System (18)** | 3.44 | 3.44 | 3.5 | 3.5 | 3.61 | 3.44 | 3.44 |
| **160403 Operating System (18)** | 3.5 | 3.66 | 3.61 | 3.44 | 3.38 | 3.77 | 3.61 |
| **160404 Computer System Organization (09)** | 3.44 | 3.66 | 3.77 | 3.88 | 3.44 | 3.77 | 3.77 |
| **100004 Cyber Security (22)** | 3.68 | 3.59 | 3.59 | 3.72 | 3.81 | 3.59 | 3.81 |
| **160611 (DE-1) Network and web security (02)** | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3 | 2.5 |
| **160614 (DE-1) Cloud Computing (06)** | 4.5 | 4.33 | 3.5 | 3.8 | 4.16 | 4.33 | 4.1 |

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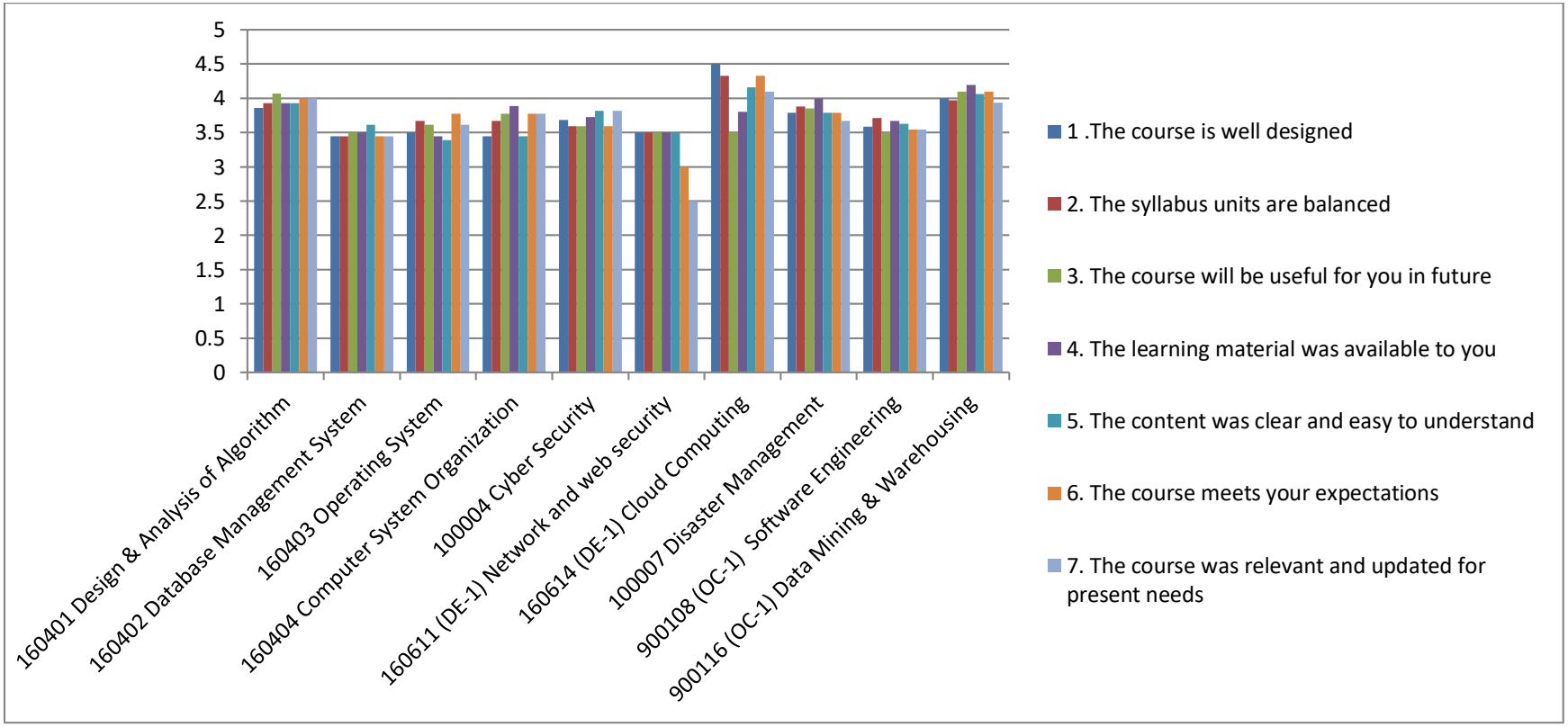
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **100007 Disaster Management (33)** | 3.78 | 3.87 | 3.84 | 4 | 3.78 | 3.78 | 3.66 |
| **900108 (OC-1) Software Engineering (24)** | 3.58 | 3.70 | 3.5 | 3.66 | 3.62 | 3.54 | 3.54 |
| **900116 (OC-1) Data Mining & Warehousing (31)** | 4 | 3.96 | 4.09 | 4.19 | 4.06 | 4.09 | 3.93 |
| **Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)** | | | | | | | |



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| Parameter(Average Grading) | | | | Strongly Agree in % | Agree in % | Neutral in % | Disagree in % | Strongly disagree in % |
|---|---|---|---|---|---|---|---|---|
| **Subject Code** | **Subject Name** | **Semester** | **Faculty Name** | | | | | |
| 160401 | Design & Analysis of Algorithm | 4 | Prof Abhishek Dixit | 27.55 | 41.83 | 29.59 | 1.02 | 0 |
| 160402 | Database Management System | 4 | Prof. Dheeraj Gurjar | 11.11 | 36.5 | 43.65 | 7.14 | 1.13 |
| 160403 | Operating System | 4 | Prof. Vishwas Shrivastava | 23.05 | 34.12 | 26.19 | 10.3 | 6.34 |
| 160404 | Computer System Organization | 4 | Prof. Punit Johari | 22.22 | 25.39 | 50.79 | 1.58 | 0 |
| 100004 | Cyber Security | 4 | Prof. Shweta Patel | 18.18 | 35.71 | 42.85 | 3.24 | 0 |
| 160611 (DE-1) | Network and web security | 6 | Prof. Santosh Sahu | 35.71 | 7.14 | 7.14 | 50 | 0 |
| 160614 (DE-1) | Cloud Computing | 6 | Prof. Vikas Sejwar | 35.55 | 40.83 | 22.59 | 1.02 | 0 |
| 100007 | Disaster Management | 6 | Prof. Namrata Agrawal | 37.22 | 21.64 | 28.57 | 11.25 | 1.29 |
| 900108 (OC-1) | Software Engineering | 6 | Prof. Rajeev K. Singh | 20.83 | 27.38 | 42.85 | 8.33 | 0.5 |
| 900116 (OC-1) | Data Mining & Warehousing | 6 | Dr. Akhilesh Tiwari | 42.39 | 25.8 | 26.26 | 5.52 | 0 |
| | | | | 27.381 | 29.634 | 32.048 | 9.94 | 0.926 |

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## COURSE CURRICULUM FEEDBACK (by Faculty on MOODLE)

| | **Action / taken ( threshold value 3.5 )** |
|---|---|
| **1** | Various workshops and FDPs are conducted to update the knowledge. (The institute supports you in your initiatives for updating your knowledge/skills and in achieving career growth. (Please comment)) |
| **2** | Along with technical subjects, a student must aware of disaster management. Disaster education provides knowledge among individuals and groups to take actions to reduce their vulnerability to disasters |

| | **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)** |
|---|---|---|---|---|---|
| **100007 Disaster Management** | 4 | 4 | 4 | 4 | 3 |
| **160401 Design & Analysis of Algorithm** | 5 | 5 | 5 | 5 | 5 |
| **160402 Database Management System** | 4 | 4 | 4 | 4 | 4 |
| **160403 Operating System** | 5 | 4 | 5 | 5 | 5 |
| **160404 Computer System Organization** | 5 | 5 | 5 | 5 | 5 |
| **100004 Cyber Security** | 5 | 4 | 4 | 5 | 4 |
| **160601 Compiler Design** | 5 | 4 | 5 | 5 | 4 |
| **160602 Computer Networks** | 4 | 4 | 5 | 5 | 5 |

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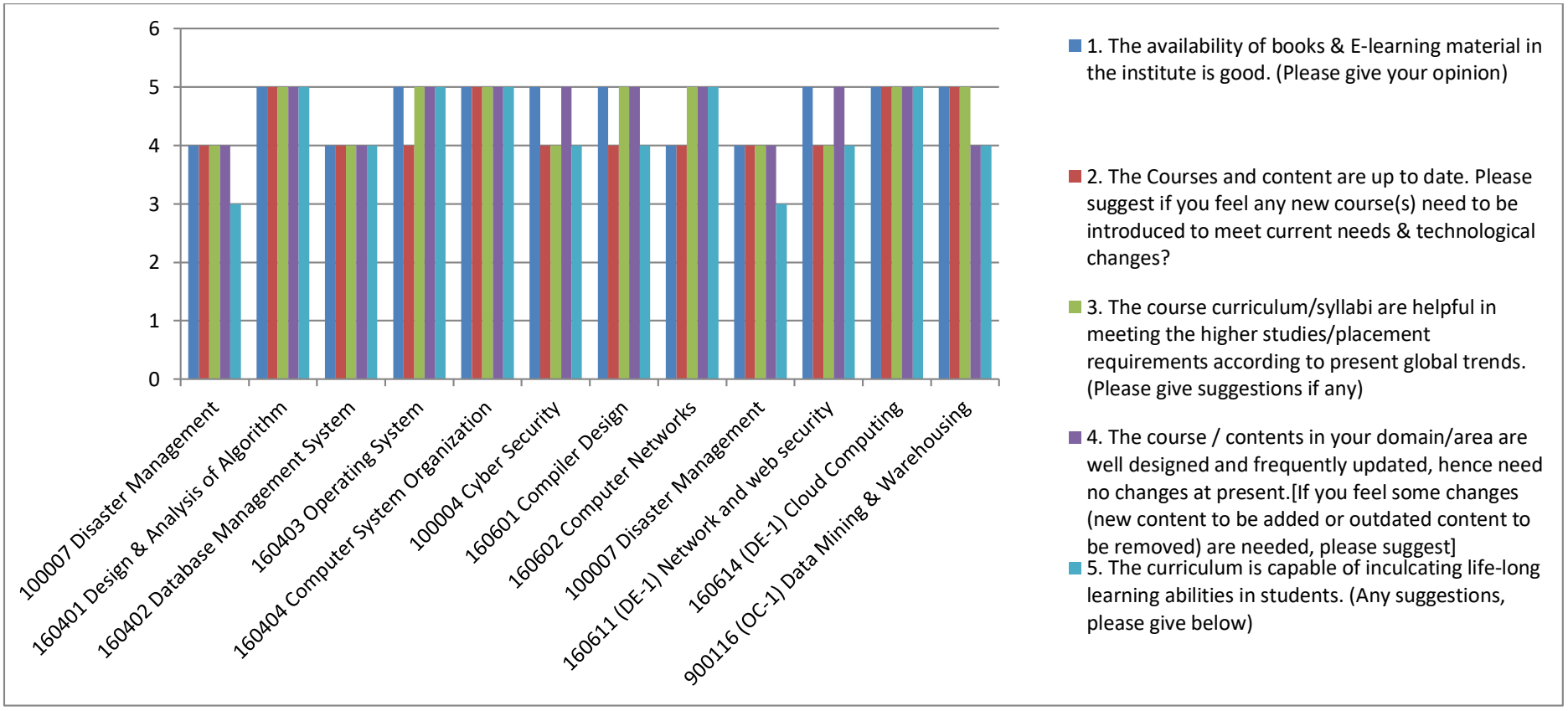
| | | | | | |
|---|---|---|---|---|---|
| **100007 Disaster Management** | 4 | 4 | 4 | 4 | 3 |
| **160611 (DE-1) Network and web security** | 5 | 4 | 4 | 5 | 4 |
| **160614 (DE-1) Cloud Computing** | 5 | 5 | 5 | 5 | 5 |
| **900116 (OC-1) Data Mining & Warehousing** | 5 | 5 | 5 | 4 | 4 |
| **Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)** | | | | | |



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| curriculum Evaluation Point | Response in % | | | | |
|---|---|---|---|---|---|
| | Strongly Agree | Agree | Neutral | Disagree | Strongly disagree |
| The availability of books & E-learning material in the institute is good | 66.66 | 33.33 | 0 | 0 | 0 |
| The Courses and content are up to date. | 33.33 | 66.66 | 0 | 0 | 0 |
| The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. | 58.33 | 41.66 | 0 | 0 | 0 |
| The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present. | 66.66 | 33.33 | 0 | 0 | 0 |
| The curriculum is capable of inculcating life-long learning abilities in students. | 41.66 | 41.66 | 16.66 | 0 | 0 |
| | 53.328 | 43.328 | 3.332 | 0 | 0 |

*******

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## Session wise analysis and impact report: April 2021 to July 2021

Based on the feedback data received from total 186 students and 13 faculty members (Second Semester – IT, IT(AIR) & IT(IoT)) for the academic session April 2021 to July 2021, following points have been analysed:

- It has been observed that, in Second semester 22.59% of students are strongly agreed, 38.74% of students are agreed, 30.09% of students are neutral, 8.35% of students are disagreed and only 0.87% of students are strongly disagreed with the syllabus/ content that they have studied in the first semester.
- Students have suggested to add some real world problems in the program based subjects like Data Structures. It has been conveyed to the students that mini skill based projects has already added in their curriculum to fulfil this need.
- It has been observed that, in Second semester 52.224% of faculty members are strongly agreed, 27.7% of faculty members are agreed, and 4.62% of faculty members are neutral, 7.7% of faculty members are disagreed and 7.7 of faculty members are strongly disagreed with the syllabus/ content that they have taught in this semester.

**COURSE CURRICULUM FEEDBACK (by Students on MOODLE): Sample Size: 21 (Avg.)**

| April-July 2021 | Student Feedback (Comments) | Response to student comments / Analysis | Remarks |
|---|---|---|---|
| **160211 Data Structure** | Should replace c with cpp | We can take both the languages for practice but beginning with 'C' is important as it is the fundamental language | (8) Mention the course / contents which in your opinion is outdated& needs to be removed. |
| **230202 Data Structure** | Some Real world Problem solving question/session | This though offered through 'soft skill based project' component, the problems and projects can be refined to meet the outcomes of the course. | (10) Is any new course required to meet current needs? |
| | Artificial Intelligence | The subject is already a part of curriculum and offered in higher semesters. | (10) Is any new course required to meet current needs? |
| | Practical part / practical labs needs to be updated | The statement seems to be vague. Though lab's experiment and skill based projects are updated on regular basis to meet the practical scenario. | (9) Name course / contents which needs to be updated. |
| **230203 OOPM** | Concept of template class vector | Already included in practical, needs | (10) Is any new course required to |

| | | | |
|---|---|---|---|
| | should also be taught. Number of sessions for topic file handling using c++ should be enhanced and should be covered in depth | to be covered | meet current needs? |
| | Arduino, rasberry pie , python etc for ITIoT | Already running in higher semester as departmental lab | (10) Is any new course required to meet current needs? |
| **Link** | https://drive.google.com/drive/folders/1fA2TCd7-sUIa8GhVQ7l-C1knqJ8lsj9V?usp=sharing | | |
| **Action/ Taken ( threshold value 3.5 )** | 1. Digital Electronics is the fundamental subject. Many applications of higher learning require this subject as prerequisite.<br>2. Digital Logic Design is the fundamental subject. Moreover, this subject is also part of syllabus for higher level competitive exams like GATE.<br>3. The OOP technology promises greater programmer productivity, better quality of software and lesser maintenance cost. All of the popular programming languages and real life applications are object oriented. | | |
| | | | |

| Parameter (Average Grading) / Subjects | 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 |
|---|---|---|---|---|---|---|---|
| 160211 Data Structures (15) | 3.86 | 3.80 | 3.86 | 3.66 | 3.66 | 3.73 | 3.80 |
| 160212 Object Oriented Programming and Methodology (12) | 4.25 | 4.20 | 3.90 | 3.80 | 3.80 | 3.90 | 3.90 |
| 160213 Digital Electronics (11) | 3.81 | 3.60 | 3.00 | 3.36 | 3.63 | 3.45 | 3.63 |
| 230201 Digital Logic Design (11) | 3.81 | 3.63 | 3.00 | 3.36 | 3.63 | 3.45 | 3.63 |
| 230202 Data Structures (24) | 4.00 | 3.91 | 4.16 | 4.04 | 4.00 | 3.83 | 3.96 |

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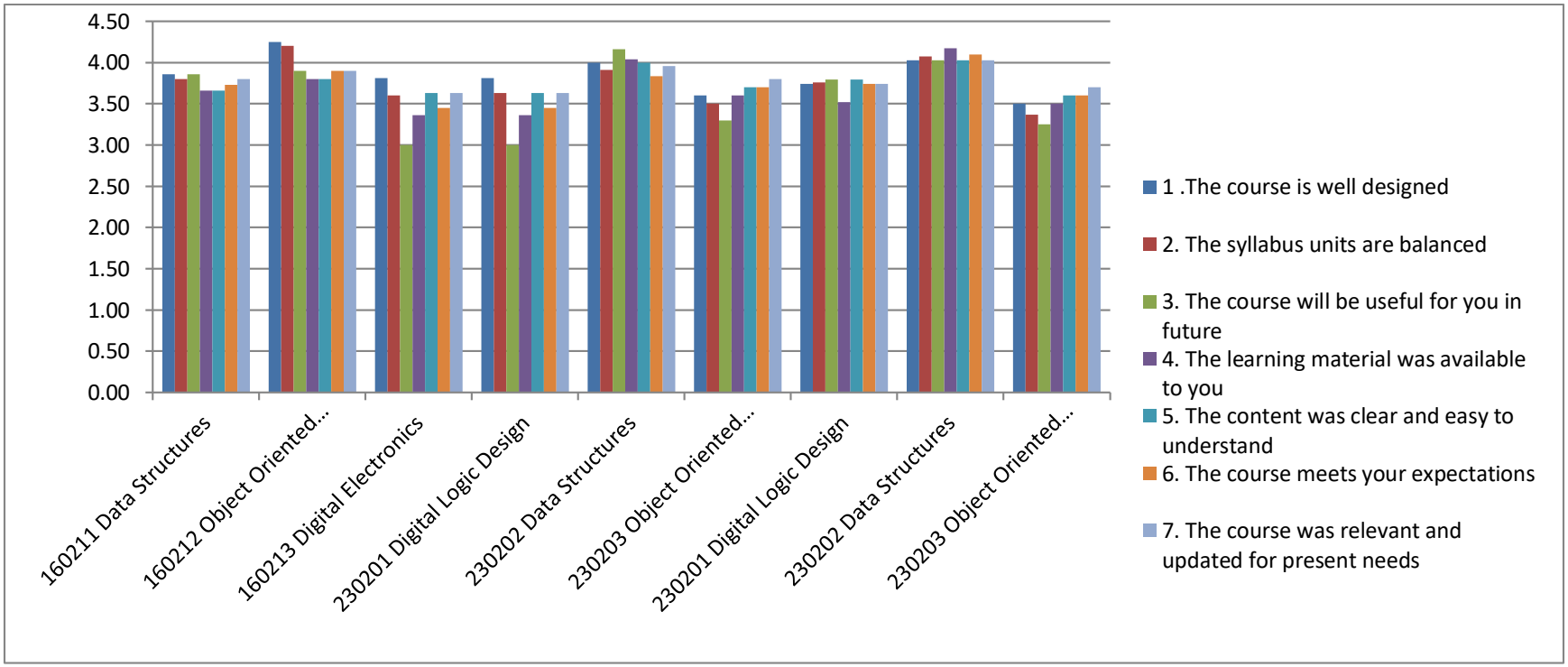
**DEPARTMENT OF INFORMATION TECHNOLOGY**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 230203 Object Oriented Programming and Methodology (10) | 3.60 | 3.50 | 3.30 | 3.60 | 3.70 | 3.70 | 3.80 |
| 230201 Digital Logic Design (54) | 3.74 | 3.76 | 3.80 | 3.52 | 3.80 | 3.74 | 3.74 |
| 230202 Data Structures (41) | 4.02 | 4.07 | 4.02 | 4.17 | 4.02 | 4.10 | 4.02 |
| 230203 Object Oriented Programming and Methodology (08) | 3.50 | 3.37 | 3.25 | 3.50 | 3.60 | 3.60 | 3.70 |
| **Course Satisfaction Index (CSI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Average, 1: Below Average)** | | | | | | | |



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| Parameter(Average Grading) | | | | Strongly Agree in % | Agree in % | Neutral in % | Disagree in % | Strongly disagree in % |
|---|---|---|---|---|---|---|---|---|
| **Subject Code** | **Subject Name** | **Semester** | **Faculty Name** | | | | | |
| 160211 | Data Structures | 2 | Dheeraj Gurjar | 21.9047619 | 43.80952381 | 23.80952381 | 10.47619048 | 0 |
| 160212 | Object Oriented Programming and Methodology | 2 | Namrata Agrawal | 42.85714286 | 20.23809524 | 28.57142857 | 7.142857143 | 1.19047619 |
| 160213 | Digital Electronics | 2 | Abhilash Sonker | 18.18181818 | 35.06493506 | 28.57142857 | 15.58441558 | 2.597402597 |
| 230201 | Digital Logic Design | 2 | Neha Bhardwaj | 18.18181818 | 35.06493506 | 28.57142857 | 15.58441558 | 2.597402597 |
| 230202 | Data Structures | 2 | Dr.Saumil Maheshwari | 32.73809524 | 39.28571429 | 28.57142857 | 4.761904762 | 0.5952380952 |
| 230203 | Object Oriented Programming and Methodology | 2 | Dheeraj Gurjar | 5.714285714 | 51.42857143 | 40 | 2.857142857 | 0 |
| 230201 | Digital Logic Design | 2 | Punit Johari | 21.42857143 | 41.26984127 | 26.45502646 | 10.31746032 | 0.5291005291 |
| 230202 | Data Structures | 2 | Shweta Patel | 35.19163763 | 41.46341463 | 18.1184669 | 4.87804878 | 0.3484320557 |
| 230203 | Object Oriented Programming and Methodology | 2 | Dheeraj Gurjar | 7.142857143 | 41.07142857 | 48.21428571 | 3.571428571 | 0 |
| | | | average | 22.593 | 38.744 | 30.098 | 8.352 | 0.87 |

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## 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.<br>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. |

| **Parameters** | **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)** |
|---|---|---|---|---|---|
| 230202(IoT) Data Structures | 5 | 5 | 5 | 5 | 5 |
| 160211(IT) Data Structures | 4 | 5 | 5 | 5 | 5 |
| 230202(AIR) Data Structures | 4 | 4 | 5 | 4 | 5 |
| 230203(AIR) Object Oriented Programming and Methodology | 3 | 4 | 4 | 4 | 4 |
| 160213(IT) Digital Electronics | 4 | 4 | 4 | 5 | 5 |
| 160212(IT) Object Oriented Programming and Methodology | 5 | 5 | 5 | 5 | 5 |
| 230203(IoT) Object Oriented Programming and Methodology | 5 | 5 | 5 | 5 | 5 |
| 630211 (M. Tech) Algorithms Design Techniques and Analysis | 4 | 5 | 5 | 4 | 5 |

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| | | | | | |
|---|---|---|---|---|---|
| 630212 (M. Tech) Advanced topics in Data Mining & Warehousing | 5 | 4 | 4 | 5 | 5 |
| 230201(AIR) Digital Logic Design | 5 | 5 | 5 | 5 | 5 |
| 230201(IoT) Digital Logic Design | 5 | 5 | 5 | 5 | 5 |
| 630213 (M. Tech) Image Processing and Retrieval Techniques | 3 | 3 | 3 | 4 | 4 |
| 800206 (M. Tech) IoT | 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)** | | | | | |

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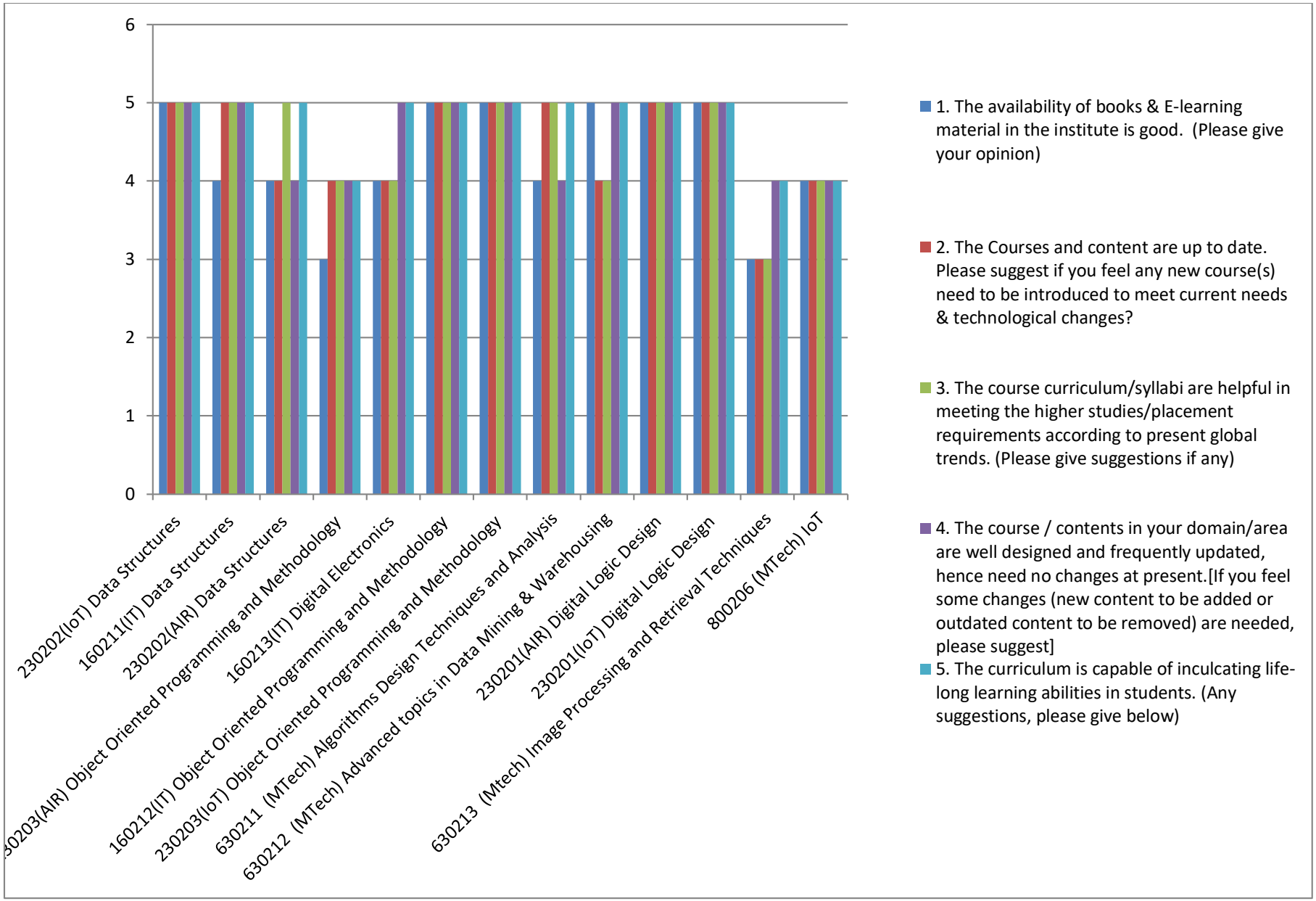

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| Curriculum Evaluation Point | Response in % | | | | |
|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
| The availability of books & E-learning material in the institute is good | 7.7 | 7.7 | 7.7 | 38.5 | 38.5 |
| The Courses and content are up to date. | 7.7 | 7.7 | 7.7 | 30.8 | 46 |
| The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends. | 7.7 | 7.7 | 7.7 | 23 | 53.8 |
| The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present. | 7.7 | 7.7 | 0 | 30.8 | 53.8 |
| The curriculum is capable of inculcating life-long learning abilities in students. | 7.7 | 7.7 | 0 | 15.4 | 69.02 |
| | 7.7 | 7.7 | 4.62 | 27.7 | 52.224 |

*******

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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 40 Alumni of above mentioned batch following points have been analysed:

- It has been observed that, in Second semester 22.59% of students are strongly agreed, 38.74% of students are agreed, 30.09% of students are neutral, 8.35% of students are disagreed and only 0.87% of students are strongly disagreed with the syllabus/ content that they have studied in the first semester.

| S. No. | **Analysis** | **Action Taken** |
|---|---|---|
| 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. |
| 2 | also 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. |
| 3 | Try to add course regarding remove nervous Ness during interviews | Self-study & seminar gives a platform to the student where he can improve himself wrt communication. |
| 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. |
| 5 | Last 3 semester's subjects were totally from non CSE/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. |
| 6 | More practical Labs than Theory classes** | Try to add practicals where not included, and add more practicals where already included for practice. |
| 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. |
| 8 | focus more on Al and machine learning | This course has already added in higher semesters. |
| 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 companys for internships. |
| 10 | data science problem solving | This course has already added in higher semesters. |
| 11 | Basic Need Of Understanding of Current Technology Management | Mini skill project and proficiency in subjects enhance the students' power of thinking and coding. |

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| PARAMETERS | Strongly Agree (5) | Agree (4) | Satisfactory (3) | Disagree (2) | Strongly disagree (1) |
|---|---|---|---|---|---|
| Course content is interesting and as per Industry needs | 10 | 22 | 4 | 4 | 0 |
| Are you able To apply, analyze, design and create products and solutions for real life Engineering problems | 4 | 24 | 9 | 3 | 0 |
| Do you feel that you are capable of learning new things in the constantly changing technological world. | 5 | 24 | 9 | 2 | 0 |
| Do you find yourself capable of making a good career | 6 | 24 | 8 | 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. | 5 | 26 | 8 | 1 | 0 |
| Link of the Document | https://docs.google.com/spreadsheets/d/178Lg_wG9bXJjWlOF-7dakqlPNUzch-H-/edit?usp=sharing&ouid=103555980183400298166&rtpof=true&sd=true | | | | |

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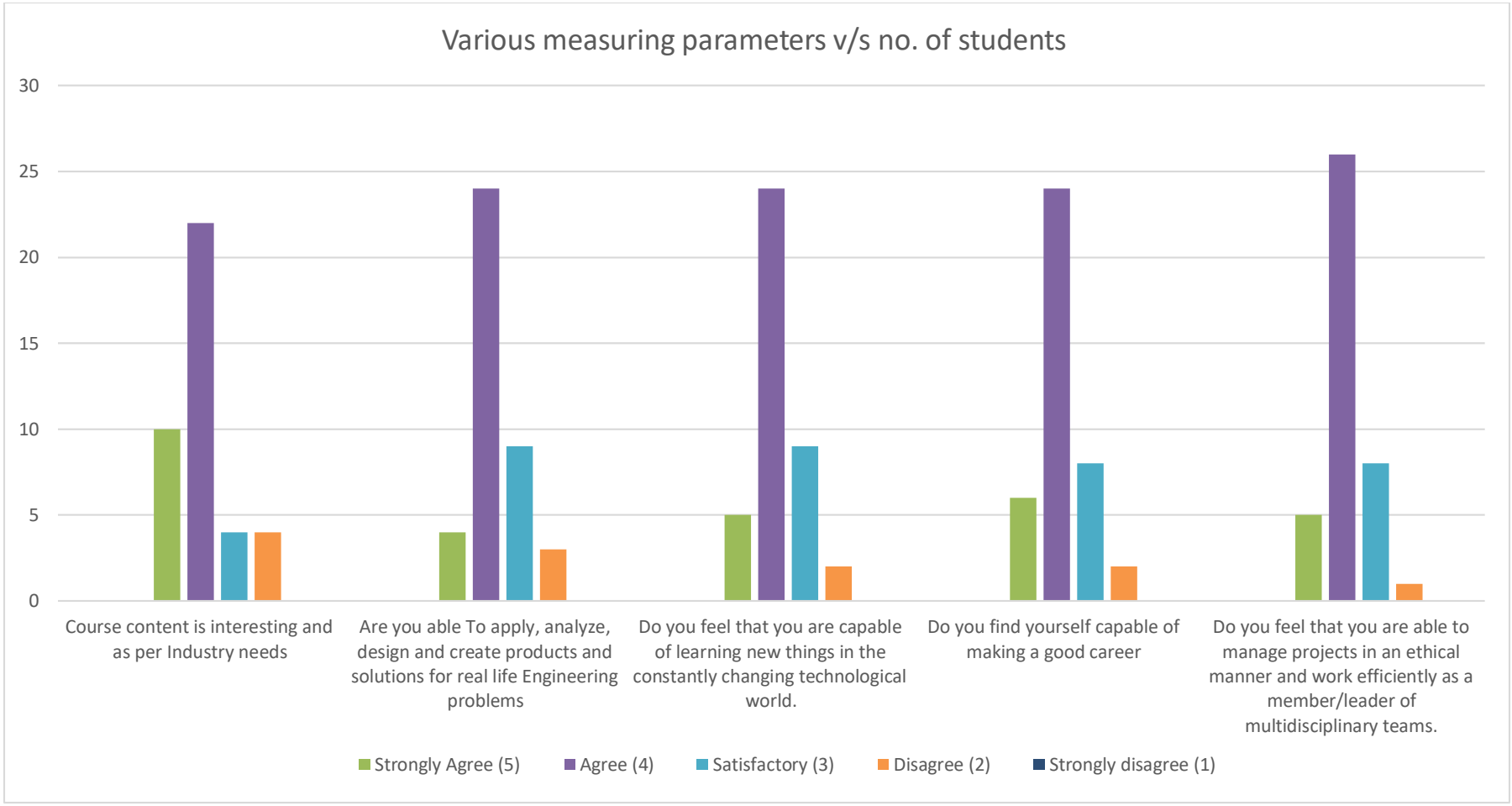

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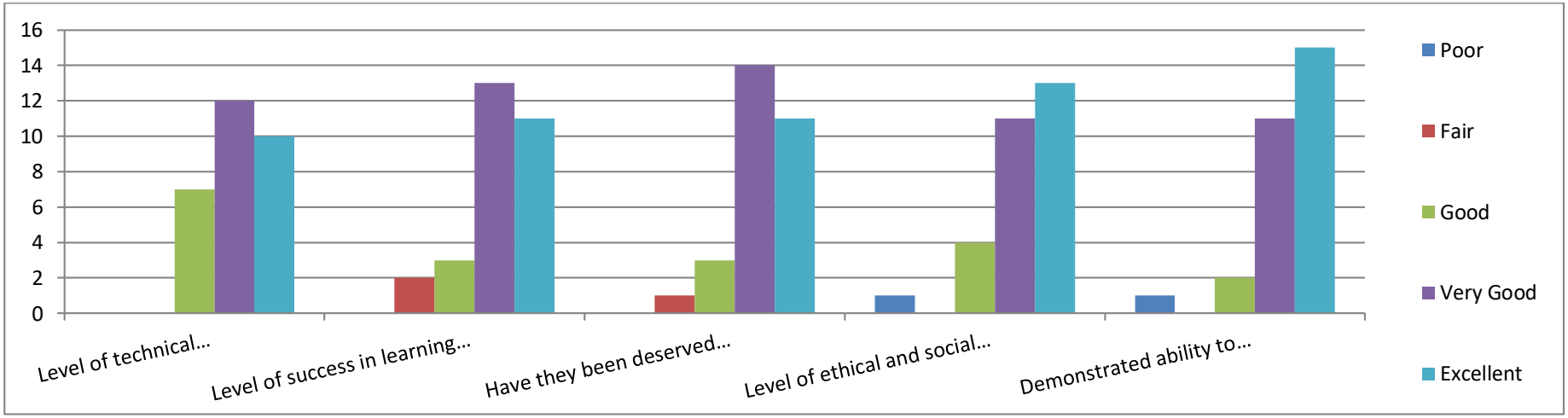
**DEPARTMENT OF INFORMATION TECHNOLOGY**

## EMPLOYER SATISFACTION SURVEY: (January to June 2019): Sample Size: 29

## SUMMARY SHEET (Employer Satisfaction Survey) Sample Size : 29

| Parameter (Average Grading) | Poor | Fair | Good | Very Good | Excellent | Employer Satisfaction Index |
|---|---|---|---|---|---|---|
| Level of technical contribution | 0 | 0 | 7 | 12 | 10 | **4.10** |
| Level of success in learning new areas, engaging in professional development, and adapting to technological change | 0 | 2 | 3 | 13 | 11 | **4.14** |
| Have they been deserved for elevation to higher level ? | 0 | 1 | 3 | 14 | 11 | **4.21** |
| Level of ethical and social responsibility | 1 | 0 | 4 | 11 | 13 | **4.21** |
| Demonstrated ability to work well on a team | 1 | 0 | 2 | 11 | 15 | **4.34** |
| **Employer Satisfaction Index (ESI) (on a scale of 5) (5: Excellent, 4: Very Good, 3: Good, 2: Fair, 1: Poor)** | | | | | | |



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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**ANNEXURE - XIX**

# *List of New Courses*

**[ITEM IT – 23]**

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## DIGITAL IMAGE PROCESSING FOR MEDICAL APPLICATIONS

**Prerequisites:** Basics of Linear Algebra.

## COURSE OBJECTIVES

- To learn the fundamentals of medical imaging systems.
- To learn the basics of digital image processing techniques.
- To have an understanding on the application of digital image processing techniques on medical images.

---

**Unit I**

**Introduction to Medical Imaging Systems**: Medical Images Obtained with Ionizing Radiations, Medical Images Obtained with Non-Ionizing Radiations.

**Unit II**

**Fundamentals of Digital Image Processing**: Digital Image Fundamentals, Human Visual System, Image as a 2D Data, Image Representation – Gray Scale and Color Images, Image Sampling and Quantization.

**Unit III**

**Image enhancement in Spatial domain:** Basic Gray Level Transformations, Histogram Processing Techniques, Spatial Filtering, Low Pass Filtering, High Pass Filtering. Image Smoothing, Image Sharpening, Homomorphic Filtering, Edge Enhancement, Edge Detection, Image Segmentation.

**Unit IV**

**Morphological Image Processing**: Erosion, Dilation, Opening, Closing, Basic Morphological Algorithms: Hole Filling, Connected Components, Thinning.

**Unit V**

**Case Studies**: Medical Applications of Imaging.

---

## RECOMMENDED BOOKS


- W. Birkfellner, Applied Medical Image Processing: A Basic Course, CRC Press, Second Edition, 2014.
- Bankman, Handbook of Medical Image Processing and Analysis, Academic Press, Second Edition, 2008.
- R. Gonzalez and R. Woods, Digital Image Processing, Prentice-Hall.
- K. Jain, Fundamentals of Digital Image Processing, Prentice Hall.
- W. K. Pratt, Digital Image Processing, Wiley.

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## COURSE OUTCOMES

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

CO1. define basic principles of medical imaging systems.

CO2. learn image enhancement techniques for medical image processing.

CO3. understand the applications of image processing techniques on medical images.

CO4. explain algorithms used to enhance medical images for better visualization.

CO5. design methodologies to extract certain features for further analysis.

CO6. apply Digital Image Processing techniques to Medical image databases.

---

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## 5G TECHNOLOGY AND IOT

**Prerequisites:** Students are advised to have prior knowledge gained from Computer Networks or Wireless Communication Systems before taking this course.

## COURSE OBJECTIVES

- To understand 5G network architecture, features, components and its challenges.
- To gain in-depth knowledge of wireless technology like LTE, mmWare and massive MIMO.
- To provide an overview understanding of IoT, its relevance to industries, its use cases and 5G standard along with 5G applications.

---

**Unit-I**

**Trend of Mobile Communication:** Evaluation of Mobile Technologies 1g to 4g, Evolution of LTE Technology to Beyond 4g, LTE Network Architecture, Building Blocks of 5g, Salient Features of 5g, Applications, Advantages and Disadvantages, Technological Challenges.

**Unit-II**

**5G Communications:** mmWave Communications, Spectrum and Regulations, Channel Propagations, Hardware Technologies for mmW Systems, Massive Mimo, Machine Type Communications (Mtc), Device-to-Device Communications (D2d), Multihop D2D, Vehicle-to-Vehicle Communications (v2x), Tactile Internet.

**Unit-III**

**IEEE802 Standard:** 802.11 (WiFi), 802.11ax (WiFi6), 802.15.1 (Bluetooth), 802.15.4 (Zigbee), 802.16 (WiMax), 5G Networking Standards: NSA, SA.

**Unit-IV**

**The Impact of 5G on IoT:** Architecture of IoT, IoT Communication Model, Data-Intensive IoT, Routing and Security Aspects, Mobile IoT, 5G Solution for IoT: URLLC, 5G Network Features for IoT: Mobility and Connected Devices, Latency and Reliability, Speed and Throughput, Service Deployment and Energy Efficiency.

**Unit-V**

**5G for IoT Applications:** Smart City, Voice Powered Technologies, Retail Data Tracking and Real Time Data Collection, Patient Health Monitoring (Healthcare),

Artificial Reality/Virtual Reality, Multimedia Streaming, Home Appliances, Cloud Gaming etc.

---

## RECOMMENDED BOOKS


- Afif Osseiran, Jose.F.Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks", Cambridge University Press.
- Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press.
- Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
- Internet of Things from Hype to Reality, The Road to Digitization, Ammar Rayes and Samer Salam, Second Edition, Springer.


---

## COURSE OUTCOMES

After completion of course, student will be able to:

CO1. classify the evolution of mobile communication towards 5G.

CO2. illustrate 5G technology in terms of mmWave, D2D, massive MIMO.

CO3. summarize the list of IEEE standards and its working.

CO4. identify the impact of 5G technologies on IoT.

CO5. explain 5G solutions with respect to V2X and IoT.

CO6. elaborate the working of 5G communication for IoT applications.

---

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## ROBOTICS & VISION CONTROL

**Prerequisites:** Basics of Linear Algebra and Mechanics.

## COURSE OBJECTIVES

- To learn the fundamentals of Computer Vision framework.
- To lean Digital Image Processing techniques.
- To understand Camera optical system.

---

**Unit-I**

**Computer Vision:** Introduction, Human Eye and Camera, Vision as an Information Processing Task, Homogeneous Transformations, Geometrical Framework for Vision, 2D and 3D Images Interpretation, Industrial Applications.

**Unit-II**

**Digital Image:** Basics of Image Processing, Image Acquisition, Segmentation, Binary and Grey Morphology Operations, Thresholding, Filtering, Edge and Corner Detection, Features Detection, Contours, Tracking Edges and Corners, Object Detection and Tracking, Image Data Compression, Real Time Image Processing.

**Unit-III**

**Camera and Optical System:** Camera Technology, Analog and Digital Camera, Camera Model, CCD and CMOS Technology, Sensor Size, Intrinsic and Extrinsic Camera Parameters, Camera Calibration, Systems of Lenses, Thin Lens, Beam Converging and Beam Diverging Lenses, General Imaging Equation, Aberrations, Practical Aspects.

**Unit-IV**

**Fundamental of Robot. Robotics:** Introduction, Robot, Definition, Robot Anatomy, Robot Parts and Their Functions, Classification of Robot and Robotic Systems, Laws of Robotic, Co-Ordinate Systems, Drives and Control Systems, Power Transmission Systems, Planning for Navigation, Different Applications.

**Unit-V**

**Robot Actuator Effectors:** Types of End Effectors, Types of Grippers, Interface, Sensors, Touch and Tactile Sensors.

---

**RECOMMENDED BOOKS**


- Computer Vision: Algorithms and Applications, Richard Szeliski, Ed. Springer, ISBN-10: 1848829345, ISBN-13: 978- 1848829343, Publishing, 2010.
- Handbook of Robotics, Bruno Siciliano, Ed. Springer-Verlag Berlin and Heidelberg GmbH & Co. K, ISBN-10: 354023957X, ISBN-13: 978-3540239574, Publishing, 2008.


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## COURSE OUTCOMES

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

CO1. tell about kinematics and dynamics.

CO2. summarize the digital image processing techniques.

CO3. build basics of camera technology.

CO4. examine the fundamentals of robotics and its components

CO5. design controllers for tracking control of a robot.

CO6. develop the concepts of computer vision for motion control of robotic systems.

---

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## ROBOTIC VISION AND MACHINE LEARNING

**Prerequisites:** Student should have knowledge image processing fundamental.

## COURSE OBJECTIVES

- To understand the fundamentals of vision perception of robot
- To understand the time varying trajectory in motion.
- To understand the sequence learning for robotic vision through Machine learning

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**Unit -I**

**Computer Vision Fundamentals:** Image Accusation and Representation, Image Transformation, Filtering, Restoration, Morphing, Camera Models, Calibration, Vision Geometries: Single View Geometry, Multiple View Geometry, Epipolar Geometry, RANSAC and Real Application Instances.

**Unit- II**

**Feature Based Alignment:** Pose Estimation, Time Varying Pose and Trajectories, Structure From Motion, Dense Motion Estimation, Visual Odometry: Semi-Direct VO, Direct Sparse Odometry, Bundle Assignments.

**Unit-III**

Initialization, Tracking, Mapping, Geometric SLAM Formulations: Indirect Vs. Direct Error Formulation, Geometry Parameterization, Sparse and Dense Model, Optimization Approach, Relocalization and Map Optimization, Visual SLAM, Examples: Indirect (Feature Based) Methods: MonoSLAM , PTAM, ORB-SLAM, Direct Methods: DTAM, LSD-SLAM, Sensor Combinations: IMU, Mono and Stereo, RGB-Depth, Analysis and Parameter Studies.

**Unit -IV**

Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Concepts of Machine Learning and Deep Learning, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation Modelling.

**Unit-V**

**Sequence Learning for Robotic Vision:** Active Learning, Incremental and Class Incremental Learning Identify Unknowns, Uncertainty Estimation, Embodiment for

Robotic Vision: Active Vision, Spatial and Temporal Embodiment, Reasoning for Object, Scene and Scene Semantics.

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**RECOMMENDED BOOKS**


- Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision, Cengage, Third Edition (2013).
- Dahiya, Ravinder S., Valle, Maurizio, Robotic Tactile Sensing, Springer, 2013
- S. R. Deb, Sankha Deb, Robotics Technology and Flexible Automation, 2nd edition, McGraw Hill Education, 2017.


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## COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define image processing for robotic vision.

CO2. identify the working of robot vision geometry.

CO3. analyse time varying pose and trajectories.

CO4. examine the motion trajectory of robotic vision.

CO5. compare various Motion trajectory of robotic vision.

CO6. elaborate working of robot vision using machine learning.

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# MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

**DEPARTMENT OF INFORMATION TECHNOLOGY**

## RANDOMIZED ALGORITHMS IN MACHINE LEARNING

**Prerequisites:** Basic background in Boolean Algebra and Probability Theory.

## COURSE OBJECTIVES

- To understand the basic ideas and intuition behind modern randomized machine learning methods.
- To learn, various randomized machine learning methods.
- To learn handle the imbalanced classification problems.

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**Unit -I**

**Preliminaries, What is Machine Learning:** Varieties of Machine Learning, Learning Input/ Output Functions, Bias, Sample Application. Imbalance Learning. Extreme Learning Machine, Smote Methods.

**Unit- II**

Neural Networks, Threshold Logic Units, Linear Machines, Networks of Threshold Learning Units, Training of Feed Forward Networks By Back Propagations, Stochastic Gradient Descent, Least Squares Regression.

**Unit- III**

Statistical Learning, Background and General Method, Learning Belief Networks, Nearest Neighbor. Decision-Trees, Supervised Learning of Uni-Variance Decision Trees, Network Equivalent of Decision Trees, Over Fitting and Under Fitting With Evaluation.

**Unit- IV**

Naïve Bayes Classifier Bayesian Belief Network, K- Nearest Neighbor Learning Locally Weighted Regression Radial Bases Functions – Case Based Learning.

**Unit -V**

Computational Learning Theory, Vapnik-Chernonenkis Dimension, Unsupervised Learning, Clustering Methods Based On Euclidian Distance and Probabilities, Hierarchical Clustering Methods, Randomized Algorithms, Weighted Extreme Learning Machine, Random Vector Functional Link.

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## RECOMMENDED BOOKS

- Introduction to Machine learning, Nils J.Nilsson

- Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch
- Introduction to Machine Learning with Python A guide for data scientists, Andreas, C.Muller & Sarah Guido, O'Reilly

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## COURSE OUTCOMES

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

CO1. define pattern classification algorithms for classify data.

CO2. demonstrate the concept of Randomized Algorithms.

CO3. apply classification algorithms for finding relationships between data variables.

CO4. apply Regression algorithms for finding relationships between data variables.

CO5. examine various supervised leaning and unsupervised leaning techniques and their comparison.

CO6. build the concept of working of Randomized Algorithms for imbalance learning.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## FUNDAMENTALS OF INFORMATION RETRIEVAL

**Prerequisites:** Basic knowledge of query languages.

## COURSE OBJECTIVE

- To familiar with the techniques information retrieval process along with the importance of information in the current scenario.
- To identify the meaningful information and process for extracting knowledge from different sources.
- To study the concepts of the web and techniques of information retrieval for extracting knowledge from the web.

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**Unit-I**

**Introduction to Information Retrieval (IR):** Process of Retrieval, IR Models Properties, Basic IR Models (Boolean Model, Vector Model, Probabilistic Model), Alternative Set Theoretic Models, Alternative Algebraic Models (Generalized Vector Space Model, Latent Semantic Indexing Model).

**Unit-II**

**Operations and Languages Query:** Querying based on Keyword, Pattern Matching, Structural Queries, and User Relevance Feedback.

**Unit-III**

**Evaluation in Information Retrieval:** Retrieval Performance Evaluation Recall, Precision, Mean average Precision, F-Measure, User Oriented Measures, Discounted Cumulated Gain.

**Unit-IV**

**Searching the Web:** Characterizing the web, Crawling the Web, Mercator: A Scalable, Extensible Web Crawler, Parallel Crawlers, Different Types of Web Crawler, Anatomy of a Large-Scale Hypertextual Web Search Engine, Page Rank Algorithm.

**Unit-V**

**IR Applications:** Summarization and Question Answering.

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## RECOMMENDED BOOKS


- Ricardo Baeza-Yate, Berthier Ribeiro-Neto, “Modern Information Retrieval”, Second Edition, Addison Wesly (2011).

- G. G. Chowdhury "Introduction to Modern Information Retrieval", Second Edition, Neal Schuman Publishers (2003).
- David A. Grossman, Ophir Frieder, "Information Retrieval: Algorithms, and Heuristics", Springer (2004).

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## COURSE OUTCOMES

At the end of this course the students will be able to:

CO1. recall the basic concepts and techniques in Information Retrieval.

CO2. explain the issues involved in representing and retrieving documents.

CO3. explain the latest technologies for linking, describing and searching the Web.

CO4. identify the relationship between IR, hypermedia, and semantic models.

CO5. apply and implement techniques for the preprocessing needed for information retrieval systems and to develop a small information retrieval system.

CO6. evaluate the different evaluation strategies to the retrieved results for computing the efficiency and accuracy of the information retrieval model.

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