

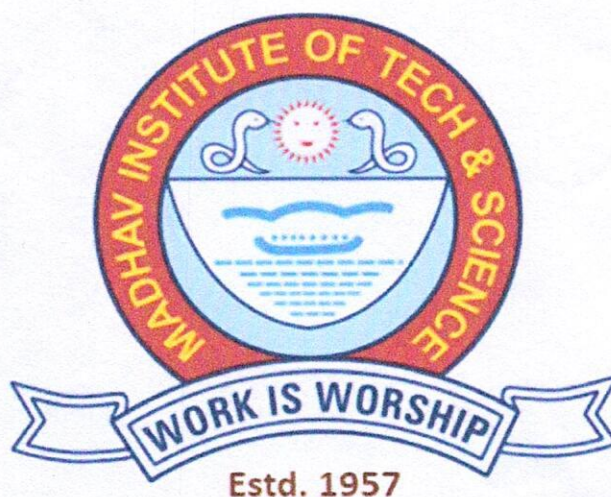
DAU 593  
06/01/2025

# **Minutes of Meeting**

## **Board of Studies of Centre for Internet of Things**

**B.Tech: Internet of Things(IoT)**

**06 Dec, 2024**



**MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR  
(Deemed to be University)  
Declared Under Distinct Category by Ministry of Education, Government  
of India  
Centre for Internert of Things**



Centre for Internet of Things

Minutes of Meeting Board of Studies

Board of Studies (BoS) meeting of the Centre for Internet of Things was held in hybrid mode on **December 06<sup>th</sup>, 2024 at 03:30 PM onwards**. The following external members were invited in addition to the faculty members of the department:

| S.No. | Name of Expert                                          | Designation and Organization                               |
|-------|---------------------------------------------------------|------------------------------------------------------------|
| 1     | Dr. Kaushlendra Sharma -1<br>(Vice-chancellor, Nominee) | Professor, Department of Electrical Engineering, DTU-Delhi |
| 2     | Mr. Mayank Soni, (Industry expert)                      | Manager, Strategy & Consulting- Accenture                  |
| 3     | Dr. Rimjhim Agrawal, (Alumus)                           | Engineers Control, General Electric Bangluru               |
| 4     | Dr. Anurag Singh, (Subject Expert)                      | Associate Professor, NIT-Delhi                             |
| 5     | Dr. Lokesh Chouhan, (Subject Expert)                    | Assistant Professor, DTU                                   |

Above mentioned External experts and the following Internal members attended the meeting:

| S.No. | Name of the faculty with Designation                           | S.No. | Name of the faculty with Designation           |
|-------|----------------------------------------------------------------|-------|------------------------------------------------|
| 1     | Dr. Praveen Bansal,<br>Assistant Professor & Coordinator, CIoT | 9     | Dr. Murali Manohar,<br>Assistant Professor     |
| 2     | Dr. Dhananjay Bisen,<br>Assistant Professor                    | 10    | Dr. Soumyajit Ghosh,<br>Assistant Professor    |
| 3     | Dr. Aditya Dubey,<br>Assistant Professor                       | 11    | Dr. Geetam Shukla,<br>Assistant Professor      |
| 4     | Dr. Priyanka Garg,<br>Assistant Professor                      | 12    | Dr. Namita Arya,<br>Assistant Professor        |
| 5     | Dr. Nookala Venu,<br>Assistant Professor                       | 13    | Dr. Aftab Ahmed Ansari,<br>Assistant Professor |
| 6     | Dr. Saurabh Kumar Rajput,<br>Assistant Professor               | 14    | Prof. Vinay Gupta,<br>Assistant Professor      |
| 7     | Dr. Bhavna Rathore,<br>Assistant Professor                     | 15    | Prof. Poonam Singh,<br>Assistant Professor     |
| 8     | Dr. Kaushal Pratap Sengar,<br>Assistant Professor              |       |                                                |

Handwritten signatures and initials of the attendees, including names like Praveen, Dhananjay, Aditya, Priyanka, Nookala, Saurabh, Bhavna, Kaushal, Murali, Soumyajit, Geetam, Namita, Aftab, Vinay, and Poonam.



Centre for Internet of Things

Agenda-wise Summary of BoS Meeting

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                                           |               |                    |                  |                |                        |                     |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------|---------------|--------------------|------------------|----------------|------------------------|---------------------|
| Item CloT1 | To confirm the minutes of previous BoS meeting held in the month of December 2024<br>➤ The minutes of the last BoS held on May 30 <sup>th</sup> , 2024 at 03:30 PM were confirmed.                                                                                                                                                                                                                                                               |                                              |                                                           |               |                    |                  |                |                        |                     |
| Item CloT2 | To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OCcourse to be offered in online mode with credit transfer for the batch admitted in academic year 2021-22. (The total credits from I-VIII semester should not be less than 160 for this batch).<br>➤ The scheme structure of B. Tech. VIII Semester of Internet of Things for the batch admitted in 2021-22 is prepared and is annexed at <b>ANNEXURE-1</b> |                                              |                                                           |               |                    |                  |                |                        |                     |
| Item CloT3 | To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in online mode under Departmental Elective(DE) category courses (DE-5) and open category (OC3) for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in academic year 2020-21)<br><br>➤ List of offered DE and OC courses in online is annexed at <b>ANNEXURE-2</b>   |                                              |                                                           |               |                    |                  |                |                        |                     |
|            | S. No                                                                                                                                                                                                                                                                                                                                                                                                                                            | Course Code                                  | Course Name                                               | Offered By    | Duration of Course | Start Date       | End Date       | Exam Date              | Faculty Mentors     |
|            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                | 230862                                       | Cloud Computing and Distributed Systems                   | IIT Patna     | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025         | Dr. Aditya Dubey    |
|            | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                | 230863                                       | Machine Learning for Engineering and science applications | IIT Madras    | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 27, 2025         | Dr.Dhananjay Bisen  |
|            | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                | 230864                                       | Discrete Time Signal Processing                           | IIT Kharagpur | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025         | Dr. Soumyajit Ghosh |
|            | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                | 230865                                       | Cryptography and Network Security                         | IIT Kharagpur | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 27, 2025         | Dr. Namita Arya     |
|            | Details of Departmental Open Category (OC-3): SWAYAM/NPTEL/MOOC                                                                                                                                                                                                                                                                                                                                                                                  |                                              |                                                           |               |                    |                  |                |                        |                     |
|            | S. No                                                                                                                                                                                                                                                                                                                                                                                                                                            | Course Code                                  | Course Name                                               | Offered By    | Duration of Course | Start Date       | End Date       | Exam Date              | Faculty Mentors     |
|            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                | 91xxxx                                       | Introduction To Internet Of Things                        | IITKGP        | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025         | Dr. Priyanka Garg   |
|            | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                | 91xxxx                                       | Introduction To Soft Computing                            | IITKGP        | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025         | Prof. Poonam Singh  |
| 3          | 91xxxx                                                                                                                                                                                                                                                                                                                                                                                                                                           | Fuzzy Sets, Logic and Systems & Applications | IIT Kanpur                                                | 12 Weeks      | January 20, 2025   | April 11, 2025   | April 27, 2025 | Dr. Aftab Ahmed Ansari |                     |
| 5          | 91xxxx                                                                                                                                                                                                                                                                                                                                                                                                                                           | Sensors and Actuators                        | IISc Bangalore                                            | 12 Weeks      | January 20, 2025   | April 11, 2025   | April 27, 2025 | Dr. Bhavna Rathore     |                     |

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| S. No | Tracks                                              | Course Name                                                     | Offered By    | Duration of Course | Start Date       | End Date       | Exam Date      |
|-------|-----------------------------------------------------|-----------------------------------------------------------------|---------------|--------------------|------------------|----------------|----------------|
| 1.    | <b>Artificial Intelligence and Machine Learning</b> | Introduction to Machine Learning                                | IITM          | 12 weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 2.    |                                                     | Programming, Data Structures And Algorithms Using Python        | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 3.    |                                                     | Artificial Intelligence (AI) for Investments                    | IIT Kanpur    | 12 weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 4.    |                                                     | Machine Learning for Engineering and science applications       | IIT Madras    | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 27, 2025 |
| 5.    |                                                     | Artificial Intelligence: Knowledge Representation and Reasoning | IIT Madras    | 12 Weeks           | January 20, 2025 | April 11, 2025 | May 3, 2025    |
| 6.    | <b>Smart Computing &amp; Algorithms</b>             | Design and analysis of algorithms                               | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 7.    |                                                     | Programming, Data Structures And Algorithms Using Python        | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 8.    |                                                     | The Joy of Computing using Python                               | IIT Ropar     | 12 Weeks           | January 20, 2025 | April 11, 2025 | May 3, 2025    |
| 9.    |                                                     | Discrete Mathematics                                            | IIT Ropar     | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 10.   |                                                     | Programming in Modern C++                                       | IITKGP        | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 11.   |                                                     | Introduction To Haskell Programming                             | CMI           | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 12.   | <b>Embedded System Design</b>                       | Embedded Sensing, Actuation and Interfacing Systems             | IT Kharagpur  | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 13.   |                                                     | Embedded Systems Design                                         | IIT Kharagpur | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 14.   |                                                     | Embedded System Design with ARM                                 | IIT Kharagpur | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 15.   |                                                     | Discrete Time Signal Processing                                 | IIT Kharagpur | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |

ii) Minor Specialization (for students of other departments)

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Ad <sup>gaur</sup> Mr. P. B. G. Ch. or 10 Birth. Aug 2



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Following courses are identified & proposed for their requirement towards getting Minor Speciation in Internet of Things:

| Domain             | Course Name                                                    | Offered By     | Duration of course | Exam date      |
|--------------------|----------------------------------------------------------------|----------------|--------------------|----------------|
| Internet of Things | Introduction To Internet Of Things                             | IITKGP         | 12 Weeks           | April 26, 2025 |
|                    | Introduction To Industry 4.0 And Industrial Internet Of Things | IITKGP         | 12 Weeks           | April 27, 2025 |
|                    | Introduction To Soft Computing                                 | IITKGP         | 8 Weeks            | March 22, 2025 |
|                    | Cloud Computing                                                | IIT Kharagpur  | 12 Weeks           | May 3, 2025    |
|                    | Sensors and Actuators                                          | IISc Bangalore | 12 Weeks           | April 27, 2025 |

(i) Following courses are identified & proposed for VIII Semester for their requirement towards getting Honors

#### Tracks for Honor Specialization

| S. No | Tracks                                       | Course Name                                                     | Offered By     | Duration of Course | Start Date   | End Date     | Exam Date    |
|-------|----------------------------------------------|-----------------------------------------------------------------|----------------|--------------------|--------------|--------------|--------------|
| 1.    | Artificial Intelligence and Machine Learning | Introduction to Machine Learning                                | IITM           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 2.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 3.    |                                              | Artificial Intelligence: Knowledge Representation And Reasoning | IITM           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 4.    |                                              | Introduction to Soft Computing                                  | IITKGP         | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 5.    |                                              | Deep Learning                                                   | IIT-Ropar      | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 1.    | Smart Computing & Algorithms                 | Design and analysis of algorithms                               | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 2.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 3.    |                                              | The Joy of Computing using Python                               | IIT Ropar      | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 4.    |                                              | Discrete Mathematics                                            | IIT Ropar      | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 5.    |                                              | Foundations of                                                  | IIIT Bangalore | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | May 4, 2025  |

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M. P. Singh  
R. Singh  
A. Singh  
A. Singh  
A. Singh



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|  |    |          |                                                          |        |          |              |              |              |
|--|----|----------|----------------------------------------------------------|--------|----------|--------------|--------------|--------------|
|  |    |          | Cryptography                                             |        |          | 2025         |              |              |
|  | 1. | Robotics | Embedded Systems Design                                  | IITKGP | 12 weeks | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
|  | 2. |          | Sensors and Actuators                                    | IISc   | 12 weeks | Jan 20, 2025 | Apr 11, 2025 | Apr 27, 2025 |
|  | 3. |          | Microprocessors and Microcontrollers                     | IITKGP | 12 weeks | Jan 20, 2025 | Apr 11, 2025 | Apr 27, 2025 |
|  | 4. |          | Introduction to Machine Learning                         | IITM   | 12 weeks | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
|  | 5. |          | Programming, Data Structures And Algorithms Using Python | CMI    | 8 weeks  | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |

**ii) Minor Specialization (for students of other departments)**

Following courses are identified & proposed for their requirement towards getting Minor Speciation in Internet of Things:

| Domain             | Course Name                                                    | Offered By     | Duration of course | Exam date      |
|--------------------|----------------------------------------------------------------|----------------|--------------------|----------------|
| Internet of Things | Introduction To Internet Of Things                             | IITKGP         | 12 Weeks           | April 26, 2025 |
|                    | Introduction To Industry 4.0 And Industrial Internet Of Things | IITKGP         | 12 Weeks           | April 27, 2025 |
|                    | Introduction To Soft Computing                                 | IITKGP         | 8 Weeks            | March 22,2025  |
|                    | Cloud Computing                                                | IIT Kharagpur  | 12 Weeks           | May 3, 2025    |
|                    | Sensors and Actuators                                          | IISc Bangalore | 12 Weeks           | April 27, 2025 |

| Item        | Bangalore                                                                                                                                                                                                                                                                                                                                         | Weeks | 2023 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Item CloT05 | <p>To review and finalize the scheme structure of B.Tech VI Semester under the flexible curriculum (Batch admitted in 2022-23)</p> <p>➤ The Scheme structure of V semester of the B.Tech Internet of Things of 2022-23 admitted batch under the flexible curriculum is at <b>ANNEXURE -4</b></p>                                                  |       |      |
| Item CloT06 | <p>To review and finalize the syllabi for all Departmental Core (DC) Courses of B. Tech. VI Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs.</p> <p>➤ The syllabus of B. Tech. V Semester of Internet of Things for the batch admitted in 2022-23 is prepared and is annexed at <b>ANNEXURE-5</b></p> |       |      |
| Item CloT07 | <p>To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (for batch admitted in 2022-23) in online mode under Self-Learning/ Presentation, in the B.Tech. VI Semester.</p> <p>➤ The List of Self Study and Seminar of B. Tech. VI Semester of Internet of Things for the batch</p>                                        |       |      |

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admitted in 2021-22 is prepared and is annexed at **ANNEXURE-6**

Details of Departmental Elective (DE-1): SWAYAM/NPTEL/MOOC

| S. No | Course Code | Course Name                                                    | Offered By    | Duration of Course | Start Date        | End Date       | Exam Date      |
|-------|-------------|----------------------------------------------------------------|---------------|--------------------|-------------------|----------------|----------------|
| 1     | 2230664     | Introduction To Industry 4.0 And Industrial Internet Of Things | IIT Patna     | 8 weeks            | January 20, 2025  | March 14, 2025 | March 22, 2025 |
| 2     | 2230665     | Foundation of Cloud IoT Edge ML                                | IIT Patna     | 8 weeks            | February 17, 2025 | April 11, 2025 | April 26, 2025 |
| 3     | 2230666     | Edge Computing                                                 | IIT Kharagpur | 12 weeks           | January 20, 2025  | April 11, 2025 | April 27, 2025 |

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Item CloT08 | To review and finalize the courses & syllabi to be offered (for batch admitted in 2022-23) under the Open Category (OC) Courses to be offered in traditional mode for B Tech VI semester of other departments along with their COs.<br>➤ Prepared and is annexed at <b>ANNEXURE-7</b>                                                                                                                                                                       |
| Item CloT09 | To propose the Experiment list/ Lab manual/ Skill Based Mini Project for all the Laboratory Courses to be offered in B. Tech. VI Semester (for batch admitted in 2022-23).<br>➤ The Experiment list/ Lab manual for various laboratory courses to be offered in along with the Course Outcomes of VI semester of the B.Tech Internet of Things students of 2022-23 admitted batch under the flexible curriculum is included at <b>ANNEXURE-8&amp;9</b>      |
| Item CloT10 | To review and finalize the scheme structure of B.Tech IV Semester under the flexible curriculum (Batch admitted in 2023-24)<br>➤ The Scheme structure of IV semester of the B.Tech Internet of Things of 2023-24 admitted batch under the flexible curriculum is at <b>ANNEXURE -10</b>                                                                                                                                                                     |
| Item CloT11 | To propose the syllabi for all Departmental Core (DC) Courses of B. Tech. IV Semester (for batch admitted in 2023-24) under the flexible curriculum along with their COs.<br>➤ The syllabus of B. Tech. IV Semester of Internet of Things for the batch admitted in 2023-24 is prepared and is annexed at <b>ANNEXURE-11</b>                                                                                                                                |
| Item CloT12 | To propose the Experiment list/ Lab manual and skill based mini project for all the Laboratory Courses to be offered in B. Tech. IV Semester (for batch admitted in 2023-24).<br>➤ The Experiment list/ Lab manual for various laboratory courses to be offered in along with the Course Outcomes of IV semester of the B.Tech Internet of Things students of 2023-24 admitted batch under the flexible curriculum is included at <b>ANNEXURE-12&amp;13</b> |
| Item CloT13 | To finalize the Skill Internship Project (SIP) module to be offered in Dec 2024.<br>➤ Prepared and is annexed at <b>ANNEXURE-14</b>                                                                                                                                                                                                                                                                                                                         |
| Item CloT13 | To propose the content of the courses identified for MITS-MOOC development to be offered in blended mode for VII Semester DE/OC courses for the batch admitted in 2022-23.<br>➤ Prepared and is annexed at <b>ANNEXURE-15</b>                                                                                                                                                                                                                               |
| Item CloT14 | To discuss and recommend the scheme structure & syllabi of PG Programme (M.E./M.Tech./MCA/MBA) along with their Course Outcomes (COs)<br><b>Not Applicable</b>                                                                                                                                                                                                                                                                                              |

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*(Handwritten signatures and initials)*



माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर  
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR  
Deemed University  
(Declared under Distinct Category by Ministry of Education, Government of India)  
NAAC ACCREDITED WITH A++ Grade  
G-10, K. Madhav, Gwalior (M.P.) - 474005, INDIA  
Centre for Internet of Things

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Item CloT15                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | To recommend the scheme structure and Syllabus of Ph.D. Course Work (specific to Doctoral Research Scholars, if any)<br><br><i>Not Applicable</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Item CloT16                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for all the courses taught during Jan-June 2024 session<br><ul style="list-style-type: none"><li>➤ The CO attainments for each course was computed by the respective faculty are compiled for the November. The gap in attainment, if any, was identified and the corrective actions to be taken were proposed by the subject faculty is reviewed.</li><li>➤ The CO attainment level of the subject in the above duration is annexed at <b>ANNEXURE -16</b></li></ul> |
| Item CloT16                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | To review the PO attainments levels and suggest the actions to be taken for improvement in PO attainment.<br><ul style="list-style-type: none"><li>➤ The data is attached as <b>ANNEXURE-17</b></li></ul>                                                                                                                                                                                                                                                                                                                                                                                               |
| Item CloT17                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | To review and finalize the CO-PO mapping matrix for all the courses to be taught in Jan-June 2024.<br><ul style="list-style-type: none"><li>➤ The data is attached as <b>ANNEXURE-18</b></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                      |
| Item CloT18                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | To review curricula feedback from various stakeholders, its analysis and impact.<br><ul style="list-style-type: none"><li>➤ The Feedback on the curriculum is taken from the Stakeholder (Students, Faculty, Alumni, and Employer) in online mode using Moodle &amp; Google Forms. The analysis is carried out on a scale of 1-5. Few suggestions were received from the alumni &amp; employer. Some of them are already in place. The feedback analysis is annexed at <b>ANNEXURE -19</b></li></ul>                                                                                                    |
| Item CloT19                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Any other matter.<br><ul style="list-style-type: none"><li>➤ Discussion on Establishment of New Labs in the Centre for IoT</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Suggestion by Expert Members:<br><ol style="list-style-type: none"><li>1. Assignments based on Realistic Problem solving will be given</li><li>2. MOOCs offered courses will be mentored</li><li>3. Labs on Wireless Embedded System will be introduced</li><li>4. Courses offered on Applications of IoT for Power Electronics will be offered</li><li>5. Students will be motivated to participated in the online coding competitions for enhancing the programming skills</li></ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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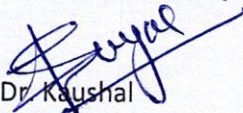
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*Del* *M.L.* *Prof.* *G* *B* *Shah* *Prayal*

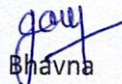


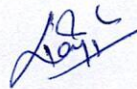
माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर  
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Gala Ka Mandir, Gwalior (M.P.) - 474005 INDIA  
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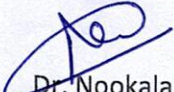
The meetings ended with the vote of thanks by BoS Coordinator.

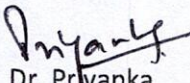
  
Dr. Dhananjay  
Bisen

  
Dr. Kaushal  
Pratap Sengar

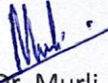
  
Dr. Bhavna  
Rathore

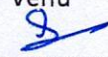
  
Dr. Saurabh  
Kumar Rajput

  
Dr. Nookala  
Venu

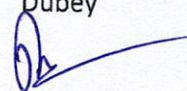
  
Dr. Priyanka  
Garg

  
Dr. Aditya  
Dubey

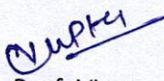
  
Dr. Murli  
Manohar

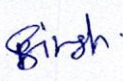
  
Dr. Soumyajit Ghosh

Dr. Geetam Shukla

  
Dr. Namita  
Arya

  
Dr. Aftab  
Ahmed Ansari

  
Prof. Vinay  
Gupta

  
Prof. Poonam  
Singh

Present online

**Dr. Kaushlendra Sharma**  
Assistant Professor, Department of Computer  
Science and Engineering, IIIT-Nagpur

Present online

**Dr. Anurag Singh**  
Department of CSE  
Associate Professor, NIT-Delhi

Present online

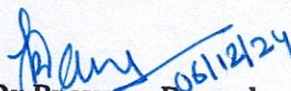
**Dr. Lokesh Chouhan**  
Associate Professor, National Forensic Science  
University, Curti Podna, Goa

Present online

**Mr. Mayank Soni**  
Custom Software, Engineer  
Senior Analyst- Accenture Pune

Present online

**Dr. Rimjhim Agrawal**  
Principal Data Scientist Utoipus Insights,  
Bangaluru

  
**Dr. Praveen Bansal**  
Coordinator, Centre for Internet of Things

  
**Dean**  
Faculty of Engineering & Technology  
MITS-DU

## Centre for Internet of Things

### Scheme of Evaluation

#### B. Tech. Internet of Things (IoT) - IV Semester

(for batch admitted in academic session 2022-23)

| S. No. | Subject Code | Category Code             | Subject Name                              | Maximum Marks Allotted |                                  |                       |                  |                      |                |                          |    |                |    | Total Marks | Contact Hours per week |    |    | Total Credits | Mode of Teaching | Mode of Exam. | Duration of Paper |
|--------|--------------|---------------------------|-------------------------------------------|------------------------|----------------------------------|-----------------------|------------------|----------------------|----------------|--------------------------|----|----------------|----|-------------|------------------------|----|----|---------------|------------------|---------------|-------------------|
|        |              |                           |                                           | Theory Slot            |                                  |                       |                  |                      | Practical Slot |                          |    |                |    |             | L                      | T  | P  |               |                  |               |                   |
|        |              |                           |                                           | End Term Evaluation    |                                  | Continuous Evaluation |                  |                      | End Sem. Exam. | Continuous Evaluation    |    | End Sem. Exam. |    |             |                        |    |    |               |                  |               |                   |
|        |              |                           |                                           | End Sem. Exam.         | \$Proficiency in subject/ course | Mid Sem. Exam.        | Quiz/ Assignment | Lab Work & Sessional |                | Skill Based Mini Project |    |                |    |             |                        |    |    |               |                  |               |                   |
| 1      | 3230421      | DC                        | Microprocessors & Embedded Systems        | 50                     | 10                               | 20                    | 20               | 40                   | 30             | 30                       | 30 | 40             | 30 | 200         | 2                      | 1  | 2  | 4             | Blended          | PP            | 2Hrs              |
| 2      | 3230422      | DC                        | Wireless Technologies for IoT             | 50                     | 10                               | 20                    | 20               | 40                   | 30             | 30                       | 30 | 40             | 30 | 200         | 3                      | -  | 2  | 4             | Blended          | PP            | 2Hrs              |
| 3      | 3230423      | DC                        | Software Engineering                      | 50                     | 10                               | 20                    | 20               | 40                   | 30             | 30                       | 30 | 40             | 30 | 200         | 3                      | -  | 2  | 4             | Blended          | PP            | 2Hrs              |
| 4      | 3230424      | DC                        | IoT Architecture and Protocols            | 50                     | 10                               | 20                    | 20               | -                    | -              | -                        | -  | -              | -  | 100         | 3                      | -  | -  | 3             | Blended          | PP            | 2Hrs              |
| 5      | 3230425      | DC                        | Network & Web Security                    | 50                     | 10                               | 20                    | 20               | -                    | -              | -                        | -  | -              | -  | 100         | 3                      | -  | -  | 3             | Blended          | PP            | 2Hrs              |
| 6      | 200XXX       | CLC                       | Novel Engaging Course (Informal Learning) | -                      | -                                | -                     | -                | 50                   | -              | -                        | -  | 50             | -  | 50          | -                      | -  | 2  | 1             | Interactive      | SO            | -                 |
| Total  |              |                           |                                           | 250                    | 50                               | 100                   | 100              | 170                  | 90             | 90                       | 90 | 170            | 90 | 850         | 14                     | 01 | 08 | 19            | -                | -             |                   |
| 7      | 3000004      | Natural Sciences & Skills | Language                                  | 50                     | 10                               | 20                    | 20               | 30                   | 10             | 10                       | 10 | 30             | 10 | 150         | 1                      | -  | 2  | Grade         | Blended          | MCQ           | 1.5 Hrs           |
| 8      | 1000005      | MAC                       | Project Management & Financing            | 50                     | 10                               | 20                    | 20               | -                    | -              | -                        | -  | -              | -  | 100         | 2                      | -  | -  | Grade         | Online           | MCQ           | 1.5Hrs            |

**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 Examination |        |         |             |      |         |        |         |             |     | Total Credits |  |
|---------------------|--------|---------|-------------|------|---------|--------|---------|-------------|-----|---------------|--|
| Theory              |        |         |             |      | Lab     |        |         |             |     | Total Credits |  |
| Offline             | Online | Blended | Interactive | NEC  | Offline | Online | Blended | Interactive | NEC | Total Credits |  |
| -                   | 02     | 15      | 03          | 01   | 03      | 03     | 01      | 01          | 01  | 19            |  |
| -                   | -      | 78.94%  | 15.78%      | 5.3% | 78.94%  | 33.3%  | 5.3%    | -           | -   | Credits %     |  |

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Faculty of Engineering & Technology  
MITS-DU



Centre for Internet of Things

(for batch admitted in academic session 2022-23)

B. Tech. Internet of Things (IoT) - VI-Semester

| B. TECH. INTERSHIP-III (On Job Training) for Four weeks duration: Evaluation in VII Semester        |               |               |                                            |                        |                                |               |                |                      |                       |                          |            |      |      |             |                        |    |       |               |                  |              |                  |
|-----------------------------------------------------------------------------------------------------|---------------|---------------|--------------------------------------------|------------------------|--------------------------------|---------------|----------------|----------------------|-----------------------|--------------------------|------------|------|------|-------------|------------------------|----|-------|---------------|------------------|--------------|------------------|
| S. No.                                                                                              | Subject Code  | Category Code | Subject Name                               | Maximum Marks Allotted |                                |               |                |                      |                       |                          |            |      |      | Total Marks | Contact Hours per week |    |       | Total Credits | Mode of Teaching | Mode of Exam | Duration of Exam |
|                                                                                                     |               |               |                                            | Theory Slot            |                                |               | Practical Slot |                      |                       | MOOCs                    |            |      |      |             |                        |    |       |               |                  |              |                  |
|                                                                                                     |               |               |                                            | End Term Evaluation    | Continuous Evaluation          |               | End Sem. Exam. | Lab work & Sessional | Continuous Evaluation |                          | Assignment | Exam |      |             |                        |    |       |               |                  |              |                  |
|                                                                                                     |               |               |                                            |                        | Proficiency in subject /course | Mid Sem. Exam |                |                      | Quiz/Assignment       | Skill Based Mini Project |            |      |      |             |                        |    |       |               |                  |              |                  |
| 1                                                                                                   | 2230601       | DC            | Compiler Design                            | 50                     | 10                             | 20            | 20             | 60                   | 20                    | 20                       | -          | -    | 200  | 3           | -                      | 2  | 4     | Blended       | PP               | 2Hrs         |                  |
| 2                                                                                                   | 2230602       | DC            | IoT System Design                          | 50                     | 10                             | 20            | 20             | -                    | -                     | -                        | -          | -    | 100  | 3           | -                      | -  | 3     | Blended       | PP               | 2 Hrs        |                  |
| 3                                                                                                   | 2230664/65/66 | DE            | Departmental Elective* (DE-1)              | -                      | -                              | -             | -              | -                    | -                     | -                        | 25         | 75   | 100  | 3           | -                      | -  | 3     | Blended       | MCQ              | 3Hrs         |                  |
| 4                                                                                                   | 9xxxx         | OC            | Open Category (OC-1)**                     | 50                     | 10                             | 20            | 20             | -                    | -                     | -                        | -          | -    | 100  | 3           | -                      | -  | 3     | Blended       | PP               | 2Hrs         |                  |
| 5                                                                                                   | 2230603       | MC            | Artificial Intelligence & Machine Learning | 50                     | 10                             | 20            | 20             | 60                   | 20                    | 20                       | -          | -    | 200  | 3           | -                      | 2  | 4     | Blended       | MCQ              | 2Hrs         |                  |
| 6                                                                                                   | 2230604       | DLC           | Minor Project-II                           | -                      | -                              | -             | -              | 60                   | 40                    | -                        | -          | -    | 100  | -           | -                      | 4  | 2     | Offline       | SO               |              |                  |
| 7                                                                                                   | 200XXX        | CLC           | Novel Engaging Course (Informal Learning)  | -                      | -                              | -             | -              | 50                   | -                     | -                        | -          | -    | 50   | -           | -                      | 2  | 1     | Interactive   | SO               |              |                  |
| 8                                                                                                   |               | NSS           | *Natural Sciences & Skills                 | 200                    | 40                             | 80            | 80             | 120                  | 40                    | 40                       | -          | -    | 600  | 1           | -                      | 2  | 2*    | -             | -                | -            |                  |
| Total                                                                                               |               |               |                                            | 400                    | 80                             | 160           | 160            | 350                  | 120                   | 80                       | 25         | 75   | 1450 | 15          | -                      | 12 | 22    | -             | -                |              |                  |
| 9.                                                                                                  | 1000007       | MAC           | Intellectual Property Rights (IPR)         | 50                     | 10                             | 20            | 20             | -                    | -                     | -                        | -          | -    | 100  | 2           | -                      | -  | Grade | Online        | MCQ              |              |                  |
| Additional Course for Honors or minor Specialization                                                |               |               |                                            |                        |                                |               |                |                      |                       |                          |            |      |      |             |                        |    |       |               |                  |              |                  |
| Summer Internship-III (On Job Training) for Four weeks duration: Evaluation in VII Semester         |               |               |                                            |                        |                                |               |                |                      |                       |                          |            |      |      |             |                        |    |       |               |                  |              |                  |
| Permitted to opt for maximum two additional courses for the award of Honors or Minor specialization |               |               |                                            |                        |                                |               |                |                      |                       |                          |            |      |      |             |                        |    |       |               |                  |              |                  |

\* proficiency in course/subject includes the weightage towards ability/skill/competence/knowledge level/ expertise attained etc. in that particular course/subject.  
\*\*PP: Pen Paper  
\*\*\*AO: Assignment + Oral  
\*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform with credit transfer, \*\* Course run in traditional mode

| Mode of Teaching |        |         |         |         |             | Mode of Examination |       |      |      |    |           |
|------------------|--------|---------|---------|---------|-------------|---------------------|-------|------|------|----|-----------|
| Theory           |        |         | Lab     |         |             | Theory              |       |      | Lab  |    |           |
| Offline          | Online | Blended | Offline | Blended | Interactive | PP                  | AO    | MCQ  | SO   | SO | SO        |
| 00               | 03     | 12      | 05      | 01      | 01          | 11                  | 00    | 07   | 02   | 01 | 01        |
| 00%              | 14.29% | 57.14%  | 23.81%  | 4.76%   | 52.4%       | 00%                 | 33.3% | 9.5% | 4.8% | 22 | Credits % |
|                  |        |         |         |         |             |                     |       |      |      |    | 4.8%      |

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## Centre for Internet of Things

| *DE-1 (SWAYAM/NPTEL/ MOOC platform) |                                                                | **Open Category (OC-1)(For students of other branches) |                                                  |
|-------------------------------------|----------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------|
| 2230664                             | Introduction To Industry 4.0 And Industrial Internet Of Things | 910xxx                                                 | Intelligent Motor Control using Microcontrollers |
| 2230665                             | Foundation of Cloud IoT Edge ML                                | 910xxx                                                 | Communication Systems for Modern Applications    |
| 2230666                             | Edge Computing                                                 |                                                        |                                                  |

(i) Following courses are identified & proposed for VI Semester for their requirement towards getting Honors (Admitted Batch 2022-23)

| S. No | Tracks                                       | Course Name                                                     | Offered By    | Duration of Course | Start Date       | End Date       | Exam Date      |
|-------|----------------------------------------------|-----------------------------------------------------------------|---------------|--------------------|------------------|----------------|----------------|
| 1.    | Artificial Intelligence and Machine Learning | Introduction to Machine Learning                                | IITM          | 12 weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 2.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 3.    |                                              | Artificial Intelligence (AI) for Investments                    | IIT Kanpur    | 12 weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 4.    |                                              | Machine Learning for Engineering and science applications       | IIT Madras    | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 27, 2025 |
| 5.    |                                              | Artificial Intelligence: Knowledge Representation and Reasoning | IIT Madras    | 12 Weeks           | January 20, 2025 | April 11, 2025 | May 3, 2025    |
| 6.    | Smart Computing & Algorithms                 | Design and analysis of algorithms                               | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 7.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI           | 8 weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 8.    |                                              | The Joy of Computing using Python                               | IIT Ropar     | 12 Weeks           | January 20, 2025 | April 11, 2025 | May 3, 2025    |
| 9.    |                                              | Discrete Mathematics                                            | IIT Ropar     | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 10.   |                                              | Programming in Modern C++                                       | IITKGP        | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 11.   | Embedded System Design                       | Introduction To Haskell Programming                             | CMI           | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 12.   |                                              | Embedded Sensing, Actuation and Interfacing Systems             | IT Kharagpur  | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 13.   |                                              | Embedded Systems Design                                         | IIT Kharagpur | 12 Weeks           | January 20, 2025 | April 11, 2025 | April 26, 2025 |
| 14.   |                                              | Embedded System Design with ARM                                 | IIT Kharagpur | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |
| 15.   |                                              | Discrete Time Signal Processing                                 | IIT Kharagpur | 8 Weeks            | January 20, 2025 | March 14, 2025 | March 22, 2025 |

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## Centre for Internet of Things

### ii) Minor Specialization (for students of other departments)

Following courses are identified & proposed for their requirement towards getting Minor Specialization in Internet of Things:

| Domain             | Course Name                                                    | Offered By     | Duration of course | Exam date      |
|--------------------|----------------------------------------------------------------|----------------|--------------------|----------------|
| Internet of Things | Introduction To Internet Of Things                             | IITKGP         | 12 Weeks           | April 26, 2025 |
|                    | Introduction To Industry 4.0 And Industrial Internet Of Things | IITKGP         | 12 Weeks           | April 27, 2025 |
|                    | Introduction To Soft Computing                                 | IITKGP         | 8 Weeks            | March 22, 2025 |
|                    | Cloud Computing                                                | IIT Kharagpur  | 12 Weeks           | May 3, 2025    |
|                    | Sensors and Actuators                                          | IISc Bangalore | 12 Weeks           | April 27, 2025 |

Mr. SK Ad  
gaur  
\*\*\*\*\*  
Prof. Dr. P. K. Singh



## Scheme of Evaluation

(for batch admitted in academic session 2021-22)

### B. Tech. VIII Semester: Internet of Things (IoT)

| S. No.                                                | Subject Code    | Category Code | Subject Name                                       | Maximum Marks Allotted                                                                              |                        |               |                |                       |                      |            |      |                          |     | Total Marks | Contact Hours per week |    |    | Mode of Teaching | Mode of Exam. |     |
|-------------------------------------------------------|-----------------|---------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|-----------------------|----------------------|------------|------|--------------------------|-----|-------------|------------------------|----|----|------------------|---------------|-----|
|                                                       |                 |               |                                                    | Theory Slot                                                                                         |                        |               | Practical Slot |                       |                      | MOOCs      |      |                          |     |             |                        |    |    |                  |               |     |
|                                                       |                 |               |                                                    | End Term Evaluation                                                                                 | Continuous Evaluation  |               | End Sem. Exam. | Continuous Evaluation |                      | Assignment | Exam |                          |     |             |                        |    |    |                  |               |     |
|                                                       |                 |               |                                                    |                                                                                                     | Proficiency in subject | Mid Sem. Exam |                | Quiz/ Assignment      | Lab work & Sessional |            |      | Skill Based Mini Project |     |             |                        |    |    |                  |               |     |
| 1.                                                    | 230862/63/64/65 | DE            | Departmental Elective* (DE-5)                      | -                                                                                                   | -                      | -             | -              | -                     | -                    | -          | 25   | 75                       | 100 | 3           | -                      | -  | -  | 3                | Online        | MCQ |
| 2.                                                    | 910**           | OC            | Open Category* (OC-3)                              | -                                                                                                   | -                      | -             | -              | -                     | -                    | -          | 25   | 75                       | 100 | 3           | -                      | -  | -  | 3                | Online        | MCQ |
| 3.                                                    | 230821          | DLC           | Internship/Research Project/ Innovation & Start-up | -                                                                                                   | -                      | -             | -              | 150                   | -                    | 250        | -    | -                        | 400 | -           | -                      | -  | 18 | 9                | Offline       | SO  |
| 4.                                                    | 230822          | -             | Professional Development sheet                     | -                                                                                                   | -                      | -             | -              | -                     | -                    | 50         | -    | -                        | 50  | -           | -                      | -  | 4  | 2                | Interactive   | SO  |
| Total                                                 |                 |               |                                                    | --                                                                                                  | --                     | --            | --             | 300                   | 150                  | 50         | 150  | 650                      | 6   | -           | 22                     | 17 |    |                  |               |     |
| Additional Course for Honours or minor Specialization |                 |               |                                                    | Permitted to opt for maximum two additional courses for the award of Honors or Minor specialization |                        |               |                |                       |                      |            |      |                          |     |             |                        |    |    |                  |               |     |

\*All of these courses will run through SWAYAM/NPTEL/ MOOC with credit transfer

# 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, technical events, institute/department)

| Mode of Teaching |        |         |        | Mode of Examination |             |        |    | Total Credits |           |
|------------------|--------|---------|--------|---------------------|-------------|--------|----|---------------|-----------|
| Offline          | Online | Blended | 06     | Lab                 | PD          | Theory |    | Total Credits | Credits % |
|                  |        |         |        | Offline             | Interactive | PP     | AO |               |           |
| -                | -      | -       | 06     | 09                  | 02          | -      | -  | 02            | 17        |
| -                | -      | 35.29%  | 52.95% | 11.76%              | -           | -      | -  | 11.76%        |           |
|                  |        |         |        | 52.95%              | 35.29%      | 06     | 09 | 11.76%        |           |
|                  |        |         |        | 52.95%              | 35.29%      | 06     | 09 | 11.76%        |           |

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**■ MITSUBISHI ■**

## \*DE-5 (SWAYAM/NPTEL/ MOOC platform)

**\*Open Category (OC-3) (SWAYAM/NPTEL/ MOOC platform)**  
(For students of other branches)

|               |                                                           |  |                                              |                                         |
|---------------|-----------------------------------------------------------|--|----------------------------------------------|-----------------------------------------|
| <b>230862</b> | Cloud Computing and Distributed Systems                   |  |                                              | <b>(For students of other branches)</b> |
| <b>230863</b> | Machine Learning for Engineering and science applications |  | Introduction To Internet Of Things           |                                         |
| <b>230864</b> | Discrete Time Signal Processing                           |  | Introduction To Soft Computing               |                                         |
| <b>230865</b> | Cryptography and Network Security                         |  | Fuzzy Sets, Logic and Systems & Applications |                                         |
|               |                                                           |  | Sensors and Actuators                        |                                         |

230866 Advanced topics in wireless communication

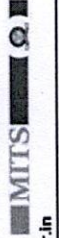
**(i) Following courses are identified & proposed for VIII Semester for their requirement towards getting Honors**

## Tracks for Honor Specialization

| S. No | Tracks                                       | Course Name                                                     | Offered By     | Duration of Course | Start Date   | End Date     | Exam Date    |
|-------|----------------------------------------------|-----------------------------------------------------------------|----------------|--------------------|--------------|--------------|--------------|
| 1.    | Artificial Intelligence and Machine Learning | Introduction to Machine Learning                                | IITM           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 2.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 3.    |                                              | Artificial Intelligence: Knowledge Representation And Reasoning | IITM           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 4.    |                                              | Introduction to Soft Computing                                  | IITKGP         | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 5.    |                                              | Deep Learning                                                   | IIT-Ropar      | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 1.    | Smart Computing & Algorithms                 | Design and analysis of algorithms                               | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 2.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |
| 3.    |                                              | The Joy of Computing using Python                               | IIT Ropar      | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | May 3, 2025  |
| 4.    |                                              | Discrete Mathematics                                            | IIT Ropar      | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 5.    |                                              | Foundations of Cryptography                                     | IIIT Bangalore | 12 Weeks           | Jan 20, 2025 | Apr 11, 2025 | May 4, 2025  |
| 1.    | Robotics                                     | Embedded Systems Design                                         | IITKGP         | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 2.    |                                              | Sensors and Actuators                                           | IISc           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 27, 2025 |
| 3.    |                                              | Microprocessors and Microcontrollers                            | IITKGP         | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 27, 2025 |
| 4.    |                                              | Introduction to Machine Learning                                | IITM           | 12 weeks           | Jan 20, 2025 | Apr 11, 2025 | Apr 26, 2025 |
| 5.    |                                              | Programming, Data Structures And Algorithms Using Python        | CMI            | 8 weeks            | Jan 20, 2025 | Mar 14, 2025 | Mar 22, 2025 |



माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर  
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR  
Deemed University  
(Declared under Distinct Category by Ministry of Education, Government of India)  
NAAC ACCREDITED WITH A++ Grade  
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Ph.: 91-751-2409300, E-mail: vicechancellor@mitsgwalior.in, Website: www.mitsgwalior.in



ii) **Minor Specialization (for students of other departments)**

Following courses are identified & proposed for their requirement towards getting Minor Speciation in Internet of Things:

| Domain             | Course Name                                                    | Offered By     | Duration of course | Exam date      |
|--------------------|----------------------------------------------------------------|----------------|--------------------|----------------|
| Internet of Things | Introduction To Internet Of Things                             | IITKGP         | 12 Weeks           | April 26, 2025 |
|                    | Introduction To Industry 4.0 And Industrial Internet Of Things | IITKGP         | 12 Weeks           | April 27, 2025 |
|                    | Introduction To Soft Computing                                 | IITKGP         | 8 Weeks            | March 22, 2025 |
|                    | Cloud Computing                                                | IIT Kharagpur  | 12 Weeks           | May 3, 2025    |
|                    | Sensors and Actuators                                          | IISc Bangalore | 12 Weeks           | April 27, 2025 |

*[Handwritten signatures and initials in blue ink, including "H. S. Desai", "S. K. Singh", "R. K. Singh", and "J. K. Singh"]*

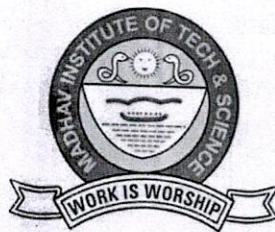
# **Syllabus**

**2023-2024**

**B.Tech.**

in

***Internet of Things (IoT)***



**Madhav Institute of Technology &  
Science**

**Gwalior-474005**

**Annexure-10**



## Centre for Internet of Things

### Microprocessors & Embedded Systems: 3230421

#### Course Objective:

- To provide fundamental operating concepts of microprocessors and microcontrollers.
- This course aims to provide students with a solid theoretical basis as well as comprehensive professional understanding of Arduino and Raspberry Pi.

**Unit I. Microprocessors:** 8085-architecture, operation, pin configuration and functions, bus organization, control signal generation for external operations- fetch, IO/M, read/write, machine cycles and bus timings. Addressing mode, instruction set, Overview/concept of peripheral interfacing devices- 8251, 8253, 8255 and 8279.

**Unit II. Microcontrollers:** 8051-architecture, operation, pin configuration and functions, memory organization, register, I/O ports, addressing modes, instruction sets, instruction classification. Assembly language programming, Interrupts in 8051. Timer/Counter programming for time delay generation and waveform generation. Interfacing with ADC, DAC, LEDs and seven segment display.

**Unit III. Arduino:** Introduction to the Arduino, creating an Arduino programming Environment, Arduino IDE, creating an Arduino program, Arduino Libraries, Analog and Digital Interfacing, Adding Interrupts, communicating with devices and sensors.

**Unit IV. Raspberry Pi:** Introduction to the Raspberry Pi, basic functionality of the Raspberry Pi board and its processor, setting and configuring the board, programming on Raspberry Pi, python programming environment, python expressions, general purpose IO pins, Protocol pins, RPi/GPIO library, communicating with devices and sensors.

**Unit V. IoT application using Arduino and Raspberry Pi:** Arduino- Playing tones and a melody, alphanumeric LCD display, speed and direction control, temperature and humidity sensor interfacing. Raspberry Pi - controlling LED, interfacing an LED and Switch, Interfacing a Light Sensor (LDR), camera interfacing etc.

#### Course Outcomes:

After completing this course the student will be able to:

- Compare processor architectures, assessing their unique features and applications
- Analyze the architecture and memory organization of 8085 and 8051 processors
- Draw the schematics of various microcontrollers
- Design Raspberry Pi hardware for specific project requirements
- Develop a circuit to interface between different sensors and Arduino/Raspberry Pi

#### Recommended Books:

- "8085 Microprocessors Architecture Application and Programming", Ramesh S. Goankar, Penram International, 5<sup>th</sup> Edition.
- "The 8051 Microcontroller", Kenneth J. Ayala, Cengage learning, 3<sup>rd</sup> Edition.
- "Arduino for beginners: Essential Skills Every Maker Needs", John Baichtal, Person Education, Inc., 1<sup>st</sup> Edition.
- "Raspberry Pi User Guide", Eben Upton and Gareth Halfacree, August 2016, 4<sup>th</sup> Edition, John Wiley & Sons.
- "Programming with Raspberry Pi: Getting Started with Python", Simon Monk, January 2012, McGraw Hill Professional.

#### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

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## Centre for Internet of Things Wireless Technologies for IoT: 3230422

### Course Objectives:

This course focused into the realm of wireless technologies in the Internet of Things (IoT), focusing on hands-on applications using Arduino, NodeMCU, and ESP32. Through practical experiments and theoretical discussions, students will gain a comprehensive understanding of various wireless communication protocols and their integration into IoT systems.

### Unit 1: Introduction:

Introduction to various Arduino platforms, NodeMCU, and ESP32, covering hardware specifications, programming environments, and basic interfacing techniques and its application in industry

### Unit 2: Wi-Fi Technologies

Introduction on Wi-Fi communication, various Wi-Fi modules, particularly ESP8266 and ESP32, Wi-Fi networks for data transmission and its significance in IoT applications.

### Unit 3: Bluetooth and Zigbee Technologies

Introduction to Bluetooth and Zigbee Technologies, Bluetooth Low Energy (BLE) and Zigbee Protocol and interfacing devices, concepts of different Bluetooth modules like HC-05 and HM-10, as well as Zigbee modules such as Xbee, Security and Optimization in Bluetooth and Zigbee Networks, exchanging data, and setting up Zigbee networks and integrating these technologies into IoT projects.

### Unit 4: Long-Range and Low-Power Wireless Technologies

Introduction to LPWAN Technologies, Principles of LoRa Modulation, LoRaWAN Architecture, LoRaWAN Network Deployment, LoRaWAN Protocol Stack, Security and Performance Optimization and Emerging Trends and Future Directions

### Unit 5: Cellular and Satellite Connectivity:

Introduction to Cellular and Satellite Communication Technologies for IoT, Integration and Deployment of Cellular and Satellite Connectivity using GSM/GPRS modules like SIM800, SIM900, LTE modules, and satellite communication modules, interfacing with microcontroller and use cases in applications such as connected vehicles, remote monitoring, and global tracking.

### Course Outcomes:

- CO1: **Gain** knowledge of Arduino platforms, NodeMCU, and ESP32, including hardware specifications.  
CO2: **Explain** Wi-Fi communication principles, Wi-Fi modules (especially ESP8266 and ESP32), and their significance in IoT applications.  
CO3: **Describe** Bluetooth Low Energy (BLE) and Zigbee protocols, along with practical skills.  
CO4: **Apply** LPWAN technologies, LoRa modulation principles and its LoRaWAN architecture.  
CO5: **Apply** skills in integrating and deploying cellular (e.g., GSM, LTE) and satellite connectivity for IoT applications.

### Recommended Textbooks:

1. *Arduino Programming in 24 Hours, Sams Teach Yourself* by Richard Blum and Tim McGrath
2. *Getting Started with ESP8266: Programming the Internet of Things with Lua and Arduino* by Simon Monk
3. *Bluetooth Low Energy: The Developer's Handbook* by Robin Heydon
4. *Zigbee Wireless Networking* by Drew Gislason
5. *LoRa for the Internet of Things* by Agamemnon T. Filippou and George Mastorakis
6. *Cellular Internet of Things: Technologies, Standards, and Performance* by Olof Liberg, Marten Sundberg, and Eric Wanglund

### Course Articulation Matrix

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

7. 1 - Slightly; 2 - Moderately; 3 - Substantially

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## Centre for Internet of Things Software Engineering: 3230423

### Course Objective:

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

### Unit 1:

**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 2:

**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 3:

**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 4:

**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 5:

**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.

### Text Books:

1. Software Engineering, Sommerville, Pearson.
2. Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
3. Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.

### Course Outcomes:

After completing this course the student will be able to:

1. Analyze the foundational concepts of software engineering.
2. Discuss advanced concepts in software design illustrating their interconnections and applications.
3. Compare various techniques for software project management and estimation.
4. Implement software using cutting-edge tools and techniques
5. Develop the software through different approaches.

### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

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## Centre for Internet of Things IoT Architecture & Protocols: 3230424

### Course Objective:

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

### Unit 1:

**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 2:

**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 3:

**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 4:

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

### Unit 5:

**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.

### Text Books:

1. 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
2. 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.

### Course Outcomes:

After completing this course the student will be able to:

1. Explain various concepts, terminologies, and architecture of IoT systems
2. Describe the architectural views of IoT and various design challenges
3. Illustrate data link and network layer protocols.
4. Analyze various transport and session layer Protocols
5. Explain the need of IoT service layer protocols.

### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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## Centre for Internet of Things Network & Web Security: 3230425

### Course Objective:

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

### Unit 1:

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

### Unit 2:

**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 3:

**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 4:

**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 Policies.

### Unit 5:

**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.

### Text Books:

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

### Course Outcomes:

After completing this course the student will be able to:

1. Analyze cryptographic algorithms, hash algorithms, and authentication mechanisms.
2. Describe fundamental concepts of number theory, attacks, and security principles, for real-world applications.
3. Apply the number theory and algorithms to achieve security principles,
4. Analyze causes of various network attacks and implications.
5. Develop algorithms to predict potential attacks and controls associated with IP.

### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

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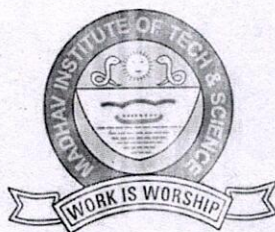
# **Syllabus**

**2022-2023**

**B.Tech.**

in

***Internet of Things (IoT)***



**Madhav Institute of Technology & Science**  
Gwalior-474005

**Annexure-5**



Centre for Internet of Things

Compiler Design: 2230601

Course Objective:

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

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 using LEX.

Unit-III

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

Unit-IV

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

Course Outcomes:

After completing this course the student will be able to:

1. Define the concepts of finite automata and context free grammar.
2. Build the concept of working of compiler.
3. Examine various parsing techniques and their comparison.
4. Compare various code generation and code optimization techniques.
5. Analyze different tools and techniques for designing a compiler.

Text/Reference Books:

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

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

*Signature*



## Centre for Internet of Things

### IoT System Design: 2230602

#### Course Objectives:

1. To provide an understanding of IoT and IIoT systems, including their architecture and applications.
2. To explore IoT dashboards and industrial protocols for real-time monitoring and data exchange.
3. To design energy-efficient power supplies and integrate microcontrollers into IoT systems.
4. To analyze the role of Programmable Logic Controllers (PLCs) in Industrial IoT applications.
5. To study practical IoT implementations through case studies in diverse fields.

#### Unit 1: Introduction to IoT and IIoT

Overview of IoT: Definition, evolution, and applications. Industrial IoT (IIoT): Concept, architecture, and applications. IoT architecture: Device, gateway, edge, and cloud layers. Challenges in IoT systems: Energy efficiency, scalability, and security. Comparison of IoT and IIoT in industrial contexts.

#### Unit 2: IoT Dashboards and Industrial Protocols

IoT Dashboards: Features, design principles, and visualization tools. Industrial IoT Protocols: OPC-UA, Modbus, Profibus, and EtherNet/IP. Integration of industrial dashboards with IoT devices for real-time monitoring. Interfacing industrial protocols with IoT for data exchange.

#### Unit 3: Design of Power Supplies and Microcontrollers

Power supply design for IoT devices: Low drop outs (LDOs) switching regulators, and buck-boost converters. Energy harvesting techniques: Photovoltaic, RF, kinetic, and thermoelectric generators (TEGs). Microcontroller selection and interfacing for IoT systems. Low-power design strategies for IoT applications.

#### Unit 4: Role of PLCs in Industrial IoT

Basics of Programmable Logic Controllers (PLCs) and their operation. PLC integration with IoT systems for industrial automation. Communication protocols for PLCs: Modbus TCP/IP, MQTT, and OPC-UA. Applications of PLCs in predictive maintenance and process control.

#### Unit 5: Case Studies and IoT System Implementation

Designing and implementing IoT systems: Methodology and best practices. Case studies: Smart Agriculture: IoT-based irrigation and soil monitoring. Industrial IoT: Predictive maintenance and asset tracking. Healthcare IoT: Remote patient monitoring and wearable devices. Smart Cities: Waste management and traffic control. Future trends in IoT system design and deployment.

#### Course Outcomes:

After completing this course the student will be able to:

1. Explain the concepts of IoT and IIoT and their impact on various industries.
2. Design and configure IoT dashboards and implement industrial communication protocols.
3. Develop efficient power supply designs and integrate microcontrollers in IoT systems.
4. Demonstrate the use of PLCs for industrial automation in IoT ecosystems.
5. Implement IoT solutions for real-world applications through case studies.

#### Recommended Books:

1. Internet of Things: Principles and Paradigms by Rajkumar Buyya and Amir Vahid Dastjerdi.
2. Industrial Internet of Things: Cyber manufacturing Systems by Sabina Jeschke et al.

#### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially



## Centre for Internet of Things

### Artificial Intelligence & Machine Learning: 2230603

#### Course Objectives:

- To provide the fundamental knowledge of Artificial Intelligence, Neural Network and Machine Learning.
- To present the basic representation and reasoning paradigms used in AI & ML.
- To understand the working of techniques used in AI & ML.

**Unit – I: Introducing Artificial Intelligence:** Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science. Perception, Understanding, and Action. Artificial intelligence vs machine learning vs deep learning and other related fields. Applications of Artificial intelligence and Machine Learning in the real world.

**Unit – II: Problem, Problem Space and Search:** Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search

**Introduction to Neural Networks:** History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering

**Unit – III: Introduction to Machine Learning:** Traditional Programming vs Machine learning. Key Elements of Machine Learning: Representation, process (Data Collection, Data Preparation, Model selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization. Types of Learning: Supervised, Unsupervised and reinforcement learning. Regression vs classification problems.

**Unit – IV: Supervised Machine Learning:** Linear regression: implementation, applications & performance parameters. Decision tree classifier, terminology, classification vs regression trees, tree creation with Gini index and information gain, ID3 algorithms, applications and performance parameters. Random forest classifier. Case study on regression and classification for solving real world problems.

**Unit –V: Unsupervised Machine Learning:** Introduction, types: Partitioning, density based, DBSCAN, distribution model-based, hierarchical, Agglomerative and Divisive, Common Distance measures, K-means clustering algorithm. Case study on clustering for solving real world problems.

#### Course Outcomes:

After completing this course the student will be able to:

1. Define basic concepts of Artificial Intelligence & Machine Learning.
2. Illustrate various techniques for search and processing.
3. Identify various types of machine learning problems and techniques.
4. Analyze various techniques in Artificial Intelligence, ANN & Machine Learning.
5. Apply AI and ML techniques to solve real world problems.

#### Recommended Books:

1. Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, PrenticeHall.
2. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-GrawHill.
3. Introduction to AI & Expert System: Dan W. Patterson, PHI.
4. Pattern Recognition and Machine Learning, Christopher M. Bishop.
5. Introduction to Machine Learning using Python: Sarah Guido
6. Machine Learning in Action: Peter Harrington

#### Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially