

Programme Specifications

B. Tech. Programme



Programme: Mechanical Engineering

**Department: Mechanical and
Manufacturing Engineering**

Faculty of Engineering & Technology

Ramaiah University of Applied Sciences

University House, New BEL Road, MSR Nagar, Bengaluru – 560 054

www.msruas.ac.in

| Programme Specifications: Mechanical Engineering | |
|---|--|
| Faculty | Engineering and Technology (FET) |
| Department | Mechanical and Manufacturing Engineering |
| Programme | Mechanical Engineering |
| Dean of Faculty | Prof. Arulanantham |
| HOD | Prof. T. N. Srikantha Dath |

1. Title of the Award

B.Tech. in Mechanical Engineering

2. Modes of study

Full-Time

3. Awarding Institution / Body

M.S.Ramaiah University of Applied Sciences – Bengaluru, India

4. Joint Award

Not Applicable

5. Teaching Institution

Faculty of Engineering and Technology

M.S.Ramaiah University of Applied Sciences - Bengaluru, India

6. Date of Programme Specifications

February 2018

7. Date of Programme Approval by the Academic Council of MSRUAS

May 2018

8. Next Review Date

May 2022

9. Programme Approving Regulatory Body and Date of Approval

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10. Programme Accrediting Body and Date of Accreditation

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11. Grade Awarded by the Accreditation Body

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12. Programme Accreditation Validity

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13. Programme Benchmark

Not Applicable

14. Rationale for the Programme

Mechanical engineering is one of the oldest disciplines of engineering. Designing and manufacturing of mechanical machinery and equipment have been there world over for many centuries. Mechanical Engineering is a foundational discipline, critical to the success of many enterprises. It plays a key role in energy, transportation, development of infrastructure and manufacturing of consumer durables.

Presently, mechanical engineers are contributing in research and development pertaining to environmental and bio-medical fields. Mechanical engineers are responsible for selection and processing of eco-friendly materials and processes, design and fabrication of medical devices and prostheses to improve quality of life.

The mechanical engineering programme at Faculty of Engineering and Technology at RUAS has been developed by the members of the faculty based on their teaching experience and long standing interactions with various Universities and industries in India and abroad. The curriculum is outcome based and helps students to develop critical thinking abilities and imbibe relevant practical skills for a smooth transition from academics to real-life work environment. Opportunities are provided for the students to do their internship in India or abroad depending on their preferences.

The alumni of the faculty hold respected positions in industry and business in India and abroad. The faculty interacts with the industry and business offering engineering and consultancy, product design and development services along with training modules to practicing professionals. The faculty interacts with more than 150 companies in public and private sectors including OEMs spread across India. The above mentioned features of the programme and the faculty members' strong footing in industry and business make the programme unique. The student admitted to the programme in mechanical engineering is given a strong foundation in real-life problem solving which is quite rare with many institutions offering similar programme.

15. Programme Mission

The purpose of the programme is creation of innovative problem solvers in multi-disciplinary settings, entrepreneurs and leaders applying the knowledge, understanding, cognitive abilities, practical skills and transferable skills gained through systematic, flexible and rigorous learning in the chosen academic domain.

16. Graduate Attributes

1. Ability to apply knowledge of mathematics, science, and Engineering fundamentals to solve complex problems in engineering
2. Ability to analyse engineering problems, interpret data and arrive at meaningful conclusions involving mathematical inferences
3. Ability to design an engineering system, component, or process to meet desired needs considering public health and safety, and the cultural, societal, and environmental considerations
4. Ability to understand and solve complex engineering problems by conducting experimental investigations
5. Ability to apply appropriate tools and techniques and understand utilization of resources appropriately to complex engineering activities
6. Ability to understand the effect of engineering solutions on legal, cultural, social and public health and safety aspects
7. Ability to develop sustainable solutions and understand their effect on society and environment
8. Ability to apply ethical principles to engineering practices and professional responsibilities
9. Ability to work as a member of a team, to plan and to integrate knowledge of various engineering disciplines and to lead teams in multidisciplinary settings
10. Ability to make effective oral presentations and communicate technical ideas to a broad audience using written and oral means
11. Ability to lead and manage multidisciplinary teams by applying engineering and management principles
12. Ability to adapt to the changes and advancements in technology and engage in independent and life-long learning

17. Programme Goal

The programme goal is to produce graduates with critical, analytical and problem solving skills, and ability to think independently, to pursue a career in Mechanical Engineering.

18. Programme Objectives

The Mechanical Engineering degree programme will impart knowledge of mechanical systems and their sub systems; enhances the understanding of underlying engineering principles that govern the behavior of mechanical systems; teach analytical modeling, simulation and analysis to study the behavior of mechanical systems; provide the skills to design, build and test mechanical systems. It also trains students on personal development and interactive skills with a feel for society.

The objectives of the programme are to enable the students to:

1. To impart knowledge on mechanical systems and their sub-systems
2. To facilitate the understanding of underlying engineering principles of mechanical systems to explain their construction and working
3. To model, simulate and analyze the behavior of mechanical systems to predict and improve their performance
4. To design and develop prototypes of mechanical systems to meet the specific needs
5. To instrument and test of mechanical systems for validation
6. To train students on commercial software tools to design, model, simulate mechanical systems
7. To train students on manufacture and production of mechanical systems
8. To educate on professional ethics, economics, social sciences and interpersonal skills relevant to professional practice
9. To provide a general perspective on lifelong learning and opportunities for a career in industry, business and commerce

19. Intended Learning Outcomes of the Programme

The Intended Learning Outcomes (ILOs) are listed under four headings:

1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability / Transferable Skills.

1. Knowledge and Understanding

After undergoing this programme, a student will be able to:

- KU1:** Identify and describe the various systems of relevance to mechanical engineering
- KU2:** Explain the underlying science and engineering principles that govern the systems/processes relevant to mechanical engineering
- KU3:** Compare and contrast newer technologies over the existing technologies
- KU4:** Collect, classify and interpret information relevant to mechanical engineering

2. Cognitive Skills

After undergoing this programme, a student will be able to:

- CS1:** Design Mechanical systems/processes based on the desired function
- CS2:** Model and simulate mechanical systems to analyze the behavior
- CS3:** Modify the existing design/processes to meet newer requirements
- CS4:** Apply science and engineering principles to evaluate performance of mechanical systems and answer "what if" questions

3. Practical Skills

After undergoing this programme, a student will be able to:

- PS1:** Manufacture/Fabricate mechanical components and assemble the system
- PS2:** Instrument a system and test for its performance
- PS3:** Operate and maintain a mechanical system for efficient and safe operations
- PS4:** Program/Control a mechanical system to deliver desired level of performance

4. Capability / Transferable Skills

After undergoing this programme, a student will be able to:

- TS1:** Manage information, develop technical reports and make presentations
- TS2:** Build, Manage and Lead a team to successfully complete a project and communicate across teams and organizations to achieve professional objectives
- TS3:** Work under various constraints to meet project targets
- TS4:** Adopt to the chosen profession by continuously upgrading his/her knowledge and understanding through Life-long Learning philosophy

20. Programme Structure

SEMESTER 1 (Physics Cycle)

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|-------------------------------------|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC101A | Engineering Mathematics - 1 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18BSC102A | Engineering Physics | 3 | 2 | 0 | 4 | 100 |
| 3 | 18ESC101A | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 | 100 |
| 4 | 18ESC102A | Elements of Electronics Engineering | 3 | 2 | 0 | 4 | 100 |
| 5 | 18ESC103A | Engineering Drawing | 1 | 0 | 4 | 3 | 100 |
| 6 | 18BSL103A | Engineering Physics Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18ESL104A | Basic Workshop Practice | 0 | 0 | 2 | 1 | 50 |
| 8 | 18ESL105A | Basic Electronics Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18HST101A | Elements of Social Sciences | 2 | 0 | 0 | 2 | 50 |
| Total | | | 15 | 6 | 10 | 23 | 700 |
| Total number of contact hours per week | | | 31 hours | | | | |
| Number of credits can be registered | | | Minimum | 18 | Maximum | 23 | |

SEMESTER 2

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC104A | Engineering Mathematics - 2 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18BSC105A | Engineering Chemistry | 3 | 0 | 0 | 3 | 100 |
| 3 | 18ESC106A | Engineering Mechanics and Construction Materials | 3 | 2 | 0 | 4 | 100 |
| 4 | 18ESC107A | Elements of Electrical Engineering | 3 | 2 | 0 | 4 | 100 |
| 5 | 18ESC108A | Elements of Computer Science and Engineering | 3 | 2 | 0 | 4 | 100 |
| 6 | 18ESL109A | Computer Programming Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18BSL106A | Engineering Chemistry Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18ESL110A | Basic Electrical Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18HST102A | Professional Communication | 2 | 0 | 0 | 2 | 50 |
| Total | | | 17 | 8 | 6 | 24 | 700 |
| Total number of contact hours per week | | | 31 hours | | | | |
| Number of credits can be registered | | | Minimum | 19 | Maximum | 24 | |

SEMESTER 1 (Chemistry Cycle)

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC101A | Engineering Mathematics - 1 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18BSC105A | Engineering Chemistry | 3 | 0 | 0 | 3 | 100 |
| 3 | 18ESC106A | Engineering Mechanics and Construction Materials | 3 | 2 | 0 | 4 | 100 |
| 4 | 18ESC107A | Elements of Electrical Engineering | 3 | 2 | 0 | 4 | 100 |
| 5 | 18ESC108A | Elements of Computer Science and Engineering | 3 | 2 | 0 | 4 | 100 |
| 6 | 18ESL109A | Computer Programming Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18BSL106A | Engineering Chemistry Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18ESL110A | Basic Electrical Engineering Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18HST102A | Professional Communication | 2 | 0 | 0 | 2 | 50 |
| Total | | | 17 | 8 | 6 | 24 | 700 |
| Total number of contact hours per week | | | 31 hours | | | | |
| Number of credits can be registered | | | Minimum | 19 | Maximum | 24 | |

SEMESTER 2

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC104A | Engineering Mathematics - 2 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18BSC102A | Engineering Physics | 3 | 2 | 0 | 4 | 100 |
| 3 | 18ESC101A | Elements of Mechanical Engineering | 3 | 0 | 0 | 3 | 100 |
| 4 | 18ESC102A | Elements of Electronics Engineering | 3 | 2 | 0 | 4 | 100 |
| 5 | 18ESC103A | Engineering Drawing | 1 | 0 | 4 | 3 | 100 |
| 6 | 18BSL103A | Engineering Physics Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18ESL104A | Basic Workshop Practice | 0 | 0 | 2 | 1 | 50 |
| 8 | 18ESL105A | Basic Electronics Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18HST101A | Elements of Social Sciences and Ethics | 2 | 0 | 0 | 2 | 50 |
| Total | | | 15 | 6 | 10 | 23 | 700 |
| Total number of contact hours per week | | | 31 hours | | | | |
| Number of credits can be registered | | | Minimum | 18 | Maximum | 23 | |

SEMESTER 3

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|----------------------------------|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC207A | Engineering Mathematics - 3 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18MEC201A | Materials Science | 3 | 0 | 0 | 3 | 100 |
| 3 | 18MEC202A | Strength of Materials | 3 | 2 | 0 | 4 | 100 |
| 4 | 18MEC203A | Engineering Thermodynamics | 4 | 0 | 0 | 4 | 100 |
| 5 | 18MEC204A | Fluid Mechanics | 4 | 0 | 0 | 4 | 100 |
| 6 | 18MEL205A | Materials Science Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18MEL206A | Strength of Materials Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18MEL207A | Fluid Mechanics Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18MEC208A | Machine Drawing | 0 | 0 | 4 | 2 | 100 |
| 10 | 18CEN201A | Environmental Studies | 2 | 0 | 0 | 2 | 50 |
| Total | | | 19 | 04 | 10 | 26 | 800 |
| Total number of contact hours per week | | | 33 hours | | | | |
| Number of credits can be registered | | | Minimum | 21 | Maximum | 26 | |

SEMESTER 4

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18BSC208A | Engineering Mathematics - 4 | 3 | 2 | 0 | 4 | 100 |
| 2 | 18MEC209A | Fluid Machines | 3 | 2 | 0 | 4 | 100 |
| 3 | 18MEC210A | Mechanisms and Kinematics of Machines | 3 | 2 | 0 | 4 | 100 |
| 4 | 18MEC211A | Manufacturing Processes | 3 | 0 | 0 | 3 | 100 |
| 5 | 18MEC212A | Applied Thermodynamics - 1 | 4 | 0 | 0 | 4 | 100 |
| 6 | 18MEL213A | Fluid Machines Laboratory | 0 | 0 | 2 | 1 | 50 |
| 7 | 18MEL214A | Mechanisms and Kinematics of Machines Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18MEL215A | Manufacturing Processes Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18MEL216A | Applied Thermodynamics Laboratory - 1 | 0 | 0 | 2 | 1 | 50 |
| 10 | 18HST201A | Constitution, Human Rights and Law | 2 | 0 | 0 | 2 | 50 |
| Total | | | 18 | 06 | 08 | 25 | 750 |
| Total number of contact hours per week | | | 32 hours | | | | |
| Number of credits can be registered | | | Minimum | 20 | Maximum | 25 | |

SEMESTER 5

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18MEC301A | Applied Thermodynamics - 2 | 4 | 0 | 0 | 4 | 100 |
| 2 | 18MEC302A | Dynamics of Machinery | 3 | 2 | 0 | 4 | 100 |
| 3 | 18MEC303A | Design of Machine Elements - 1 | 3 | 2 | 0 | 4 | 100 |
| 4 | 18MEC304A | Mechanical Measurements | 3 | 0 | 0 | 3 | 100 |
| 5 | 18MEC305A | Conventional Machining Processes and Metrology | 4 | 0 | 0 | 4 | 100 |
| 6 | 18MEL306A | Applied Thermodynamics Laboratory - 2 | 0 | 0 | 2 | 1 | 50 |
| 7 | 18MEL307A | Dynamics and Simulation Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18MEL308A | Mechanical Measurements Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18MEL309A | Conventional Machining Processes and Metrology Laboratory | 0 | 0 | 2 | 1 | 50 |
| 10 | 18MEC310A | Engineering Economics and Cost Estimation for Mechanical Engineers | 3 | 0 | 0 | 3 | 100 |
| Total | | | 20 | 04 | 08 | 26 | 800 |
| Total number of contact hours per week | | | 32 hours | | | | |
| Number of credits can be registered | | | Minimum | 20 | Maximum | 25 | |

SEMESTER 6

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|---|-----------------|-------------------|-------------------|---------------|------------|
| 1 | 18MEC311A | Heat and Mass Transfer | 3 | 2 | 0 | 4 | 100 |
| 2 | 18MEC312A | Finite Element Methods | 3 | 2 | 0 | 4 | 100 |
| 3 | 18MEC313A | Design of Machine Elements - 2 | 3 | 2 | 0 | 4 | 100 |
| 4 | 18MEC314A | Control Systems Engineering | 4 | 0 | 0 | 4 | 100 |
| 5 | 18MEC315A | Advanced Manufacturing Processes | 3 | 0 | 0 | 3 | 100 |
| 6 | 18MEC316A | Industrial Engineering and Management | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEL317A | Heat and Mass Transfer Laboratory | 0 | 0 | 2 | 1 | 50 |
| 8 | 18MEL318A | CAE Laboratory | 0 | 0 | 2 | 1 | 50 |
| 9 | 18MEL319A | Control Systems Laboratory | 0 | 0 | 2 | 1 | 50 |
| 10 | 18MEL320A | Advanced Manufacturing Processes Laboratory | 0 | 0 | 2 | 1 | 50 |
| Total | | | 20 | 06 | 08 | 27 | 800 |
| Total number of contact hours per week | | | 34 hours | | | | |
| Number of credits can be registered | | | Minimum | 22 | Maximum | 27 | |

SEMESTER 7

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|------------------------|---|----------------|-------------------|-------------------|---------------|------------|
| 1 | 18MEE41XA | Professional Core Elective - 1 | 4 | 0 | 0 | 4 | 100 |
| 2 | 18MEE42XA | Professional Core Elective - 2 | 4 | 0 | 0 | 4 | 100 |
| 3 | 18MEE43XA | Professional Core Elective - 3 | 4 | 0 | 0 | 4 | 100 |
| 4 | 18OEE41XA | Open Elective - 1 | 3 | 0 | 0 | 3 | 100 |
| 5 | 18OEE42XA | Open Elective - 2 | 3 | 0 | 0 | 3 | 100 |
| 6 | 18MEPI41A 18MEPI42A | I] Project Work - 1 II] Internship (Choose one) | 0 | 0 | 16 | 8 | 100 |
| 7 | 18MEC401A | Seminar | 2 | 0 | 0 | 1 | 50 |
| Total | | | 20 | 0 | 16 | 27 | 650 |
| Total number of contact hours per week | | | | | 36 hours | | |
| Number of credits can be registered | | | Minimum | 23 | Maximum | 28 | |

SEMESTER 8

| Sl.No. | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|---|-----------|--------------------------------|----------------|-------------------|-------------------|---------------|------------|
| 1 | 18MEE44XA | Professional Core Elective - 4 | 4 | 0 | 0 | 4 | 100 |
| 2 | 18OEE43XA | Open Elective - 3 | 3 | 0 | 0 | 3 | 100 |
| 3 | 18OEE44XA | Open Elective - 4 | 3 | 0 | 0 | 3 | 100 |
| 4 | 18MECP43A | Project Work - 2 | 0 | 0 | 24 | 12 | 100 |
| Total | | | Total | 10 | 0 | 22 | 22 |
| Total number of contact hours per week | | | | | 34 hours | | |
| Number of credits can be registered | | | Minimum | 18 | Maximum | 22 | |

Professional Core Elective Courses:

| Semester | Code | Course Title | Theory (h/W/S) | Tutorials (h/W/S) | Practical (h/W/S) | Total Credits | Max. Marks |
|----------|-----------|--|----------------|-------------------|-------------------|---------------|------------|
| 7 | 18MEE411A | Advanced Mechanics of Materials | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE421A | Fatigue and Fracture Mechanics | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE431A | Tribology | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE412A | Advanced Materials | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE422A | Automation in Manufacturing | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE432A | Lean Manufacturing | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE413A | Design of Thermal Systems | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE423A | Fluid Power Systems | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE433A | Power Plant Engineering | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE414A | Operations Research | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE424A | Total Quality Management and Six Sigma | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE434A | Quality by Design | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE415A | Robotic Systems and Applications | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE425A | Robot Kinematics and Dynamics | 4 | 0 | 0 | 4 | 100 |
| 7 | 18MEE435A | Mechatronics | 4 | 0 | 0 | 4 | 100 |
| 7 | 18BSE401A | Probability and Statistics | 4 | 0 | 0 | 4 | 100 |
| 7 | 18CSE421A | Data Science Foundation | 4 | 0 | 0 | 4 | 100 |
| 7 | 18CSE431A | Data Science Algorithms and Applications | 4 | 0 | 0 | 4 | 100 |
| 8 | 18MEE441A | Noise Vibration and Harshness | 4 | 0 | 0 | 4 | 100 |
| 8 | 18MEE442A | Surface Engineering | 4 | 0 | 0 | 4 | 100 |
| 8 | 18MEE443A | Computational Fluid Dynamics | 4 | 0 | 0 | 4 | 100 |
| 8 | 18MEE444A | Supply Chain Management | 4 | 0 | 0 | 4 | 100 |
| 8 | 18MEE445A | Robot Programming and Control | 4 | 0 | 0 | 4 | 100 |
| 8 | 18CSE441A | Data Analytics | 4 | 0 | 0 | 4 | 100 |

| | | Group -1 (Design) | | Group-2 (Manufacturing) | |
|------------|-----------------------------------|--------------------------|---------------------------------|--------------------------------|-----------------------------|
| Sem | Professional Core Elective | Course Code | Course Title | Course Code | Course Title |
| 7 | 1 | 18MEE411A | Advanced Mechanics of Materials | 18MEE412A | Advanced Materials |
| 7 | 2 | 18MEE421A | Fatigue and Fracture Mechanics | 18MEE422A | Automation in Manufacturing |
| 7 | 3 | 18MEE431A | Tribology | 18MEE432A | Lean Manufacturing |
| 8 | 4 | 18MEE441A | Noise Vibration and Harshness | 18MEE442A | Surface Engineering |

| | | Group -3 (Thermal) | | Group-4 (Industrial Engineering) | |
|------------|-----------------------------------|---------------------------|------------------------------|---|--|
| Sem | Professional Core Elective | Course Code | Course Title | Course Code | Course Title |
| 7 | 1 | 18MEE413A | Design of Thermal Systems | 18MEE414A | Operations Research |
| 7 | 2 | 18MEE423A | Fluid Power Systems | 18MEE424A | Total Quality Management and Six Sigma |
| 7 | 3 | 18MEE433A | Power Plant Engineering | 18MEE434A | Quality by Design |
| 8 | 4 | 18MEE443A | Computational Fluid Dynamics | 18MEE444A | Supply Chain Management |

| | | Group -5 (Robotics) | | Group-6 (Statistics) | |
|------------|-----------------------------------|----------------------------|----------------------------------|-----------------------------|--|
| Sem | Professional Core Elective | Course Code | Course Title | Course Code | Course Title |
| 7 | 1 | 18MEE415A | Robotic Systems and Applications | 18BSE401A | Probability and Statistics |
| 7 | 2 | 18MEE425A | Robot Kinematics and Dynamics | 18CSE421A | Data Science Foundation |
| 7 | 3 | 18MEE435A | Mechatronics | 18CSE431A | Data Science Algorithms and Applications |
| 8 | 4 | 18MEE445A | Robot Programming and Control | 18CSE441A | Data Analytics |

21. Programme Delivery

As per Time Table

22. Teaching and Learning Methods

The module delivery comprises of a combination of few or all of the following:

1. Face to face lectures using audio-visuals
2. Workshops-group discussions, debates, presentations
3. Demonstrations
4. Guest lectures
5. Laboratory-work/Field work/Workshop
6. Industry visit
7. Seminars
8. Group Exercises
9. Project Work
10. Project Exhibitions
11. Technical Events

23. Assessment and Grading

1. Every course will be assessed for a weight of 100%
2. There are two components-Component-1 and Component-2
3. Component-1 carries a weight of 50% and Component -2 carries a weight of 50%
4. Component -1 (CE) is subdivided into Term Tests and Assignments, tests carry 25% weight and assignment carry 25% weight.
5. Component -2 (SEE) is subdivided into Written Examination and Practical Examination carrying either 25% and 25% or 20% and 30% weight as applicable to specific course.
6. Laboratory Examination will have two components
 - I. Component -1(CE): Conduction of Laboratory Exercises and Submission of Report: 50% weight
 - II. Component -2: SEE (Semester End Laboratory Examination): 50% weight
7. A minimum of overall 40% is required for a pass with 40% in each of the Components
8. The marks distribution for each course is given in the programme structure-section 20
9. Other flexibilities(exceptions) as per the programme regulations

24. Attendance

A minimum of 85% attendance compulsory to appear for semester end examinations. Any condoning is as per the programme regulations.

25. Award of Class

As per the Academic Regulations for B.Tech. Programme

26. Student Support for Learning

Students are given the following support:

1. Course notes
2. Reference books in the library
3. Magazines and Journals
4. Internet facility
5. Computing facility
6. Laboratory facility
7. Workshop facility
8. Staff support
9. Lounges for discussions
10. Any other support that enhances their learning

27. Quality Control Measures

Following are the Quality Control Measures:

1. Review of course notes
2. Review of question papers and assignment questions
3. Student Feedback
4. Moderation of assessed work
5. Opportunities for the students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

28. Curriculum Map

| Course Code | | | | | | | Intended Learning Outcomes | | | | | | | | | | | |
|-------------|-----------|-----------|------------|-----------|-----------|-----------|-----------------------------|-----|-----|-----|---|-----|-----|-----|------------------|-----|-----|-----|
| | | | | | | | Knowledge and Understanding | | | | Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving) | | | | Practical skills | | | |
| HST | BSC/L/E | ESC/L | MEC/L | OEE | ME/CS | CEN | KU1 | KU2 | KU3 | KU4 | CS1 | CS2 | CS3 | CS4 | PS1 | PS2 | PS3 | PS4 |
| a | b | c | d | e | f | g | | | | | | | | | | | | |
| 101A | C101A | C101A | C201A | 401A | E411A | 201 | cf | cdf | c | cdf | f | df | d | df | | | | |
| 102A | C102A | C102A | C202A | 402A | E421A | | cdf | cdf | c | cdf | df | f | | df | | | | |
| 201A | L103A | C103A | C203A | 403A | E431A | | df | df | f | df | f | f | f | df | | b | | |
| | C104A | L104A | C204A | 404A | E441A | | df | df | f | df | f | f | | df | c | | | |
| | C105A | L105A | L205A | 405A | E412A | | bf | bf | bf | bf | | | f | df | d | c | | |
| | L106A | C106A | L206A | 406A | E422A | | cf | cf | cf | cf | f | | f | df | d | | | b |
| | C207A | C107A | L207A | 451A | E432A | | cf | cf | cf | cf | | | f | f | | d | | d |
| | C208A | C108A | C208A | 452A | E442A | | df | f | cf | cdf | d | d | f | df | | | | |
| | E401A | L109A | C209A | 453A | E413A | | bdf | bdf | bdf | bdf | f | f | f | bdf | | | | c |
| | | L110A | C210A | 454A | E423A | | df | df | f | df | d | f | df | df | | c | | |
| | | | C211A | 455A | E433A | | df | cdf | df | cdf | | | df | df | | | | |
| | | | C212A | 456A | E443A | | df | df | df | df | | f | | df | | | | |
| | | | L213A | 457A | E414A | | f | f | | f | | | | df | | d | | d |
| | | | L214A | | E424A | | f | f | f | f | | d | d | df | | | | d |
| | | | L215A | | E434A | | f | f | f | f | | | df | df | d | | | |
| | | | L216A | | E444A | | f | f | f | f | | | | df | | d | | d |
| | | | C301A | | E415A | | df | df | df | df | f | | f | df | | | | |
| | | | C302A | | E425A | | df | df | f | df | df | f | df | df | | | | |
| | | | C303A | | E435A | | df | df | f | df | d | | df | df | | | | |
| | | | C304A | | E445A | | df | df | df | df | d | f | | df | | | | |
| | | | C305A | | E421A | | df | df | df | df | | | d | df | | | | |
| | | | L306A | | E431A | | f | f | f | f | | | | df | | d | | d |
| | | | L307A | | E441A | | f | f | f | f | d | d | d | df | d | | | d |
| | | | L308A | | | | | | | | | | | d | | d | | d |
| | | | L309A | | | | | | | | | | d | d | d | | | |
| | | | C310A | | | | d | d | | d | | | | d | | | | |
| | | | C311A | | | | d | d | d | d | d | | | d | | | | |
| | | | C312A | | | | d | d | d | d | d | d | | d | | | | |
| | | | C313A | | | | d | d | | d | d | | d | d | | | | |
| | | | C314A | | | | d | d | | d | d | d | | d | | | | |
| | | | C315A | | | | d | d | d | d | | | d | d | | | | |
| | | | C316A | | | | d | d | | d | d | | | d | | | | |
| | | | L317A | | | | | | | | | | | d | | d | | d |
| | | | L318A | | | | | | | | | d | d | d | | | | |
| | | | L319A | | | | | | | | | | | | d | d | d | |
| | | | L320A | | | | | | | | | | d | d | d | | | |
| | | | C401A | | | | d | d | d | d | | | | d | | | | |
| | | | MEPI41 | | | | d | d | d | d | d | d | d | d | d | d | d | d |
| | | | MEPI42 | | | | d | d | d | d | d | d | d | d | d | d | d | d |
| | | | MECP4 | | | | d | d | d | d | d | d | d | d | d | d | d | d |
| 06 | 25 | 26 | 113 | 12 | 16 | 02 | Total 200 credits | | | | | | | | | | | |

*Depends on elective Course chosen

29. Capability / Transferable Skills Map

| Course Code | | | | | | | Skills | | | | | | | | | |
|-------------|---------|-------|--------|------|-------|------|---------|---------|---------|--------|---|----|---------|---------|----|----|
| HST | BSC/L/E | ESC/L | MEC/L | OEE | ME/CS | CEN | GK | SL | WC | OC | P | B | IM | PM | L | AO |
| a | b | c | d | e | f | g | | | | | | | | | | |
| 101A | C101A | C101A | C201A | 401A | E411A | 201A | abcdefg | abcdefg | abcdefg | g | g | ag | abcdefg | abcdefg | ag | ag |
| 102A | C102A | C102A | C202A | 402A | E421A | | abcdef | abcdef | abcdef | abcdef | a | a | abcdef | abcdef | af | af |
| 201A | L103A | C103A | C203A | 403A | E431A | | abcdef | abcdef | abcdef | b | | af | abcdef | abcdef | | a |
| | C104A | L104A | C204A | 404A | E441A | | abcdef | abcde | abcde | c | | a | abcde | abcde | | a |
| | C105A | L105A | L205A | 405A | E412A | | bcdf | bcdf | bcdf | cdf | | | bcdf | bcdf | | |
| | L106A | C106A | L206A | 406A | E422A | | bcdf | bcdf | bcdf | b | | | bcdf | bcdf | | |
| | C207A | C107A | L207A | 451A | E432A | | bcdf | bcdf | bcdf | | | | bcdf | bcdf | | |
| | C208A | C108A | C208A | 452A | E442A | | bcdf | bcdf | bcdf | c | | | bcdf | bcdf | | |
| | E401A | L109A | C209A | 453A | E413A | | cdf | cdf | cdf | c | | | cdf | cdf | | |
| | | L110A | C210A | 454A | E423A | | cdf | cdf | cdf | c | | | cdf | cdf | | |
| | | | C211A | 455A | E433A | | cdf | cdf | cdf | d | | | cdf | cdf | | |
| | | | C212A | 456A | E443A | | cdf | cdf | cdf | cdf | | | cdf | cdf | | |
| | | | L213A | 457A | E414A | | df | df | df | df | | | df | df | | |
| | | | L214A | | E424A | | df | df | df | df | | | df | df | | |
| | | | L215A | | E434A | | df | df | df | | | | df | df | | |
| | | | L216A | | E444A | | df | df | df | | | | df | df | | |
| | | | C301A | | E415A | | df | df | df | | | | df | df | | |
| | | | C302A | | E425A | | df | df | df | | | | df | df | | |
| | | | C303A | | E435A | | df | df | df | | | | df | df | | |
| | | | C304A | | E445A | | df | df | df | df | | | df | df | | |
| | | | C305A | | E421A | | df | df | df | df | | | d | d | | |
| | | | L306A | | E431A | | df | df | df | df | | | d | d | | |
| | | | L307A | | E441A | | df | df | df | df | | | d | d | | |
| | | | L308A | | | | d | d | d | | | | d | d | | |
| | | | L309A | | | | d | d | d | | | | d | d | | |
| | | | C310A | | | | d | d | d | | | | d | d | | |
| | | | C311A | | | | d | d | d | d | | | d | d | | |
| | | | C312A | | | | d | d | d | d | | | d | d | | |
| | | | C313A | | | | d | d | d | | | | d | d | | |
| | | | C314A | | | | d | d | d | | | | d | d | | |
| | | | C315A | | | | d | d | d | | | | d | d | | |
| | | | C316A | | | | d | d | d | d | | | d | d | | |
| | | | L317A | | | | d | d | d | d | | | d | d | | |
| | | | L318A | | | | d | d | d | d | d | d | d | d | | d |
| | | | L319A | | | | d | d | d | | | | d | d | | |
| | | | L320A | | | | d | d | d | | | | d | d | | |
| | | | C401A | | | | d | d | d | | | | d | d | | |
| | | | MEPI41 | | | | d | d | d | d | d | d | d | d | d | d |
| | | | MEPI42 | | | | d | d | d | d | d | d | d | d | d | d |
| | | | MECP4 | | | | d | d | d | d | d | d | d | d | d | d |

GK: Group Work; SL: Self Learning; WC: Written Communication; OC: Oral Communication P: Presentation; B: Behavioural; IM: Information Management; PM: Personal Management L: Leadership

30. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities to enhance their knowledge and network.

31. Cultural and Literary Activities

To remind and ignite the creative endeavours annual cultural festivals held and the students are made to plan and organize the activities.

32. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on regular basis.

