

Course Title:	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code:	BESCK104D/204D	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
Course Learning Objectives <ul style="list-style-type: none"> To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources. Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing. To know the concept of IC engines and Future Mobility vehicles. To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry. 			
Teaching-Learning Process <ul style="list-style-type: none"> Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. Arrange visits to show the live working models other than laboratory topics. Adopt collaborative (Group Learning) Learning in the class. Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information. 			
Module-1 (8 hours)			
Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion			
Module-2 (8 hours)			
Machine Tool Operations: Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations). Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.			
Module-3 (8 hours)			
Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines. Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.			
Module-4 (8 hours)			
Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys. Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.			
Module-5 (8 hours)			

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.

Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.

Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.

Course Outcome (Course Skill Set)

At the end of the course the student will be able to:

C01	Explain the concepts of Role of Mechanical Engineering and Energy sources.
C02	Describe the Machine Tool Operations and advanced Manufacturing process.
C03	Explain the Working Principle of IC engines and EV vehicles.
C04	Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.
C05	Explain the Concepts of Mechatronics, Robotics and Automation in IoT

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

Three Tests each of **20 Marks**;

- 1st, 2nd, and 3rd tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of **40 Marks**.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to **50 marks**

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books:**

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Reference Books:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rdEd., 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
4. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs
6. Raj kamal, " Internet of Things: Architecture and Design", McGraw hill.

Web links and Video Lectures (e-Resources):

- <https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/>
- [Videos | Makino \(For Machine Tool Operation\)](#)

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of lathe/milling/drilling operations
- Demonstration of working of IC Engine.
- Study arc welding, oxy-acetylene gas flame structure.
- Video demonstration of latest trends in mobility robotics and Automation
- Demonstration of developing models on machine tools

COs and POs Mapping (CO-PO mappings are only Indicative)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
C01	3					1	2			1		1
C02	3					1	1			1		1
C03	3					1	1			1		1
C04	3					1	1			1		1
C05	3					1	1			1		1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped