|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	I/II	**Course Type:**	**ESC**		
Course Title: Introduction to Mechanical Engineering					
Course Code:	**25MET13/23**			**Credits:**	3
Teaching Hours/Week (L:T:P:S)			3:0:0:1	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	3 Hours

I. Course Objectives

This course will enable students:

- To understand the role of mechanical engineering in various sector and its connection with emerging technologies.
- To Attain the knowledge about conventional and advanced manufacturing processes.
- To explore the recent advances in vehicle technologies & industrial automations.
- To acquire the knowledge about additive manufacturing & Power Transmission system

II. Teaching-Learning Process (General Instructions)

- Adopt different types of teaching methods to develop the outcomes through Power point presentations and Video demonstrations or Simulations.
- Arrange visits to show the working models & processes.
- Adopt collaborative (Group Learning) Learning in the class.
- Adopt Problem Based Learning (PBL), which foster students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analysing information.

III. COURSE CONTENT

Module-1: 8 Hours

Introduction to Mechanical Engineering:
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 Sources and Power Plants:
Renewable and Non-renewable energy sources. Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, and Wind power plant.

Steam: Formation of steam, Properties of Steam (No numerical problems)

Pre-requisites (Self Learning): Basic knowledge of power generation

RBT Levels: L1, L2

Module-2: 8 Hours

Introduction to IC Engines: Components and working principle of 4-Stroke Petrol and Diesel engines, performance of IC engines, simple numerical problems.

Electric vehicles and Hybrid vehicles: Working principles, Electric and Hybrid vehicle components, Brief introduction to energy storage in Electric vehicles.

Pre-requisites (Self Learning): Basic knowledge of machine tools

RBT Levels: L1, L2,L3

Module-3:	8 Hours

Mechanical Power Transmission:

Belt Drives: Introduction, types of belts & their applications, Open and Cross Belt Drive (no derivation & numerical).

Gear Drives: Types - spur, helical, bevel, worm and worm wheel, rack and pinion. velocity ratio. simple and compound gear trains, simple numerical problems

Introduction to Automation: Types of automation: Fixed, Programmable and Flexible. Basic elements of automated system, advantages disadvantages and applications of automation,

Pre-requisites (Self Learning): Basic knowledge of IC engines and power transmissions

RBT Levels: L1, L2

Module-4:	8 Hours

Machine Tool Operations:

Lathe: Principle of working of a centre lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest.

Drilling Machine: Working of simple drilling machine, drilling operations: drilling, boring, reaming,tapping, counter sinking, counter boring.

Milling Machine: Working principle of milling machine, Up milling & Down milling. milling operations: plane milling, endmilling, slot milling, angular milling, gang milling.

(No sketches of machine tools, sketches to be used only for explaining the operations).

Pre-requisites (Self Learning): Basic knowledge of EV Technology and Automation

RBT Levels: L1, L2

Module-5:	8 Hours

Introduction to Modern Manufacturing:

CNC: Introduction, components of CNC, advantages, disadvantages and applications of CNC.

Concepts of Smart Manufacturing and Industrial IoT. Introduction to 3D printing and its applications

Mechatronics: Introduction, Open-loop and closed-loop control systems, Application of mechatronics

Robotics: Robot anatomy, types of Joints, Different configurations, applications of Robots.

Pre-requisites (Self Learning): Basic knowledge of mechatronics & Manufacturing process

RBT Levels: L1, L2

IV. COURSE OUTCOMES

CO1	Recognize the significance of mechanical engineering in Industry, Society and Energy utilisation.
CO2	Apply the basic concept of I.C. engines and future mobility vehicles.
CO3	Interpret the fundamental concepts of automation, robotics and transmission system
CO4	Describe the working principles and operations of various machine tools & advance manufacturing processes

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	S1	S2	S3
CO1	3													
CO2	3	2												
CO3	3	2												
CO4	3													

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section –1

Continuous Internal Evaluation (CIE): Refer Annexure section –1

Semester End Examination (SEE): Refer Annexure section – 1

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Elements of Mechanical Engineering,	K R Gopala Krishna,	2019	Subhash Publications
2	Elements of Workshop Technology (Vol. 1 and 2)	Hazra Choudhry and Nirzar Roy	2010	Media Promotersand Publishers Pvt.
VII(b): Reference Books:				
1	An Introduction to Mechanical Engineering	Jonathan Wickert and Kemper Lewis	Third Edition	S Chand and Company
2	Manufacturing Technology-Foundry, Forming and Welding	P.N.Rao	Vol 1, 2019	Tata McGraw Hill
3	Automation, production system and CIM	Mikell P Grover	4th edition, 2018	Pearson
4	Electric & hybrid vehicles	Iqbal Hussain	3rd edition	Taylor & francis

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/cT9UN1XENNk?si=EtVUDGO8cHU5xWfY
- https://youtu.be/fw8Jfoif1BM?si=IbGrPZSPpcyW2BZq
- https://www.youtube.com/watch?v=mNOYS-duUJYEV Electrical Systems BASICS!
- https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing- and-process-industry/
- Videos | Makino (For Machine Tool Operation)

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

1. Demonstration of lathe/milling/drilling/CNC operations
2. Demonstration of working of IC engine
3. Demonstration of metal joining process
4. Video demonstration of latest trends in mobility/robotics
5. Assignments, quiz, Presentation.