RK.UNIVERSITY

SYLLABUS

Course Title	**Elements of Mechanical Engineering**
Course Code	ME119
Course Credit	Theory :03
	Practical :01
	Tutorial :00
	Credits :04

Course Learning Outcomes:

After Successful completion of the above course, students will be able to:

- **Identify** the applications of Mechanical engineering in general, Thermal science and Energy conversion in particular.
- **Recognize** and **describe** the working of components of various mechanical systems.
- **Demonstrate** the use of energy conversion process.
- **Apply** the knowledge of manufacturing processes like turning, milling, grinding etc. and industrial safety used in routine tasks.

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
	SECTION-I	
1	**Introduction:** Prime Movers, sources of energy, Different terminology, Internal Energy and Enthalpy, Zeroth Law, First Law and Second Law of Thermodynamics.	**06**
2	**Internal Combustion Engines:** Definition, Classification and Components, Various efficiencies, Working of the two stroke and Four-stroke cycle engines, S.I. and C.I. Engines.	**08**
3	**Steam Generator:** Definition, Classification, General study of Cochran, Babcock Wilcox, Lancashire, locomotive and high pressure boilers, Boilers mountings and accessories, Boiler efficiency.	**07**
	SECTION-II	
4	**Refrigeration and air conditioning:** Definition, Types of refrigerants and its characteristics, working of vapor compressor refrigeration systems, Window and Split air conditioning systems.	**04**
5	**Transmission of motion and power:** Classification and working of different types of Belt drive, Gear drive & Chain drive. Comparison of different types of power transmission drives.	**03**
6	**Air Compressors and Pumps:** Introduction and uses of compressed air, Reciprocating compressors, Rotary compressors, Reciprocating pump, types and operation, Bucket pump, Air Chamber, Centrifugal pumps, Types and Priming, Rotary pumps.	**08**

7	**Introduction to workshop technology and industrial safety:** Introduction to machining processes like turning, milling, and grinding, drilling, shaping, slotting and gear hobbing, Introduction to Forming and Casting Processes, Introduction to metrology and inspection, Introduction to industrial safety standards, Different design considerations , Factor of Safety.	**06**
	SECTION-III (Lab Session)	
8	**Introduction to manufacturing processes:** Demonstration of machinery for manufacturing processes: Lathe machine, grinder, CNC machines and their operation, Introduction to machining operations: welding, smithy, tin smithy and job demonstration in workshop for different processes, Introduction to fitting, carpentry and plumbing.	**06**
	Total Hours	

Instructional Method and Pedagogy

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory. Minimum two internal exams will be conducted and average of two will be considered as a part of overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. Minimum eight experiments shall be there in the laboratory related to course contents.
- Minimum six tutorials which includes solution of minimum five numerical under each head.

Reference Books:

1. S.B. Mathur & S. Domkundwar, "*Elements of Mechanical Engineering*," Dhanpat rai & Co.
2. R.K. Rajput, " *Thermal Engineering*", Laxmi Publications.
3. T.S. Rajan, " *Basic Mechanical Engineering*", Wiley Eastern Ltd.
4. S.B. Mathur, S. Domkundwar, " *Elements of Mechanical Engineering*", Dhanpat Rai & Sons.
5. H.R. Kapoor, "*Thermal Engineering Vol. I and II*," Tata McGraw Hill Co. Ltd.
6. G.S. Sawhney, "*Fundamental of Mechanical Engineering*", Prentice Hall of India Publication New Delhi.
7. Dr. D.S. Kumar, "*Thermal Science and Engineering*", S.K. Kataria & sons Publication New Delhi.
8. Hajra Chaudhary, "*Workshop Technology*", Media Promoters and Publishers.
9. National Bureau of Casualty and Surety Underwriters, "*Hand book of industrial safety standards".*

Additional Resources
• Steam Tables • www.nptel.iitm.ac.in • http://mechanical-engineering.in/forum/videos • www.howstuffworks.com • www.wikipedia.org • http://www.sme.org/fmp/ • http://iitvids.blogspot.in/2012/12/manufacturing-processes-ii.html • http://www.cosmolearning.com/courses/manufacturing-processes-i-538/video-lectures/ • http://www.ias.ac.in/sadhan

List of Experiments

Subject Code : ME119
Subject Name: Elements of mechanical engineering

Sr. No	Aim of experiment
1	**Demonstrate** the working of four stroke and two stroke I.C. engine.
2	**Demonstrate** & **identify** parts and applications of air compressor and pumps.
3	**Demonstrate** the working of power transmission drives.
4	**Demonstrate** the components and working of the Vapor Compression Refrigeration system and air conditioning system.
5	**Understand** the construction and working of industrial boilers using miniature models.
6	**Demonstrate** job formation on workshop practices like carpentering, fitting, plumbing, black smithy and tin smithy.
7	**Demonstrate** job formation on different machining processes like drilling, milling, grinding and shaper machine.
8	**Understand** the working of centrifugal and reciprocating pumps.
9	**Demonstrate** job formation by manufacturing processes like welding and casting.
10	**Write** a summary report on the boiler performance.
11	**Prepare** a flow chart to **understand** energy conversion process.
12	**Make** a colored sheet to **understand** workshop safety precautions.
13	**Compare** the construction of pump and compressor using drawing sheets
14	**Prepare** a layout of domestic household refrigerator and air-conditioner

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