ENGINEERING WORKSHOP

ENME 106

Lecture : 1 **Year : I**
Tutorial : 0 **Part : I**
Practical : 3

Course Objectives:
After completing this course, the students will be able to practice workshop safety rules effectively with different hand tools and machine tools for producing metal and sheet metal components. Acquire knowledge and practice on casting, forging, welding, soldering, brazing and riveting.

1 Safety Measures in the Workshop (1 hour)

1.1 Causes of accident
1.2 Types of safety: General safety, personal safety, machine and equipment safety, job safety

2 Bench Work and Fittings (4 hours)

2.1 Fitting Tools: Types, uses of holding tools, sticking tools, cutting tools (Files, chisels, hacksaw), scrapping tools (Scrappers), drilling tools (Drill bits), measuring, marking and testing tools (Steel rule, calipers, divider, surface plate, scriber, surface gauge, punches, angle plate, try square, combination sets, vernier caliper, micrometer, bevel protractor, miscellaneous tools (Wrenches, screw drivers and pliers)
2.2 Benchwork and fitting operation
2.3 Filling operations, chipping operations and sawing operation

3 Thread Cutting (1 hour)

3.1 Classification of threads
3.2 Thread cutting tools for hand threading
3.3 Threading taps: Types, uses and care
3.4 Threading dies: Types, uses and care
3.5 Thread cutting by hand: Cutting internal and external thread

4 Sheet Metal (2 hours)

4.1 Introduction, sheet metal tools, sheet metal operation
4.2 Rivet types, types of rivet joints, riveting tools and their uses, riveting procedure

5 Machine Tools (2 hours)

5.1 Lathes: Working principle, types of lathes, main parts of lathe, lathe operations (Facing, centre drilling, turning, knurling, boring, chamfering, thread cutting, counter sinking, counter boring)

5.2 Drilling Machine: Types of drilling machine, types of drill bits, drilling operations (Drilling, counter boring, reaming, tapping)

6 Forging and Casting (1.5 hours)

6.1 Introduction, forging tools, forging operations

6.2 Introduction, pattern making foundry tools, core making, sand casting process

7 Welding (2.5 hours)

7.1 Arc welding: Introduction, arc welding equipment and accessories, influencing factor in arc welding, methods of striking an arc (Tap, scratch), electrodes, types of joint, welding positions, TIG, MIG welding

7.2 Gas welding: Oxyacetylene gas welding, oxyacetylene gas welding accessories, filler rods, fluxes, types of flames and uses

8 Brazing and Soldering (1 hour)

8.1 Introduction, brazing equipment and materials, brazing process, surface clearing, join design, support parts, brazing operations (Heating, filler metal applications, flux application, clearing after brazing)

8.2 Introduction, flux, soft solder and soldering process

Practical (45 hours)

1. Fitting Practice: Demonstration, usage of different types of hand tools and measuring instruments
2. Perform filing, sawing, drilling and tapping operations on given mild steel strip
3. Machining practice: Perform lathe operations
4. Welding Practice: Perform arc welding and oxyacetylene gas welding operations
5. Sheet metal practice: Perform sheet metal operations
6. Soldering and brazing
7. Electrical installations

Reference

1. Khurmi, R.S., Gupta, J.K. (2008). A Textbook of Workshop Technology. S. Chand Publishing.
2. Raghuwanshi, B.S. (1990). A Course in Workshop Technology, Volume II (machine tools). New Delhi: Dhanpat Rai & Company.

3. Choudhary, S.K.H., Choudhary, A.K.H. (2005). Elements of Workshop Technology Vol. I and II: Manufacturing Processes. Media promoter & publishers.
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5. Rajput, R.K. (2007). A textbook of manufacturing technology: Manufacturing processes. Firewall Media.
6. Rao, K.V. (2002). Manufacturing Science and Technology-Manufacturing Processess and Machine Tools. New Age International.
7. Heinrich, G. (2006). All About Machine Tools. New Age International.