Manufacturing Processes
UTA026

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Lecture - 0

Course objectives

L	T	P	Cr
2	0	2	3.0

- This course introduces the basic concepts of manufacturing via machining, forming, joining, casting and assembly, enabling the students to develop a basic knowledge of the mechanics, operation and limitations of basic machining tools. The course also introduces the concept of metrology and measurement of parts.

Syllabus

- **Machining Processes:** Principles of metal cutting, Cutting tools, Cutting tool materials and applications, Geometry of single point cutting tool, Introduction to multi-point machining processes – milling, drilling and grinding, Tool Life, Introduction to computerized numerical control (CNC) machines, G and M code programming for simple turning and milling operations, introduction of canned cycles.
- **Metal Casting:** Principles of metal casting, Introduction to sand casting, Requisites of a sound casting, Permanent mold casting processes.
- **Metal Forming:** Forging, Rolling, Drawing, Extrusion, Sheet Metal operations.
- **Joining Processes:** Electric arc, Resistance welding, Soldering, Brazing.

Laboratory Work/Assignments/Micro Project

- **Laboratory work:** Relevant shop floor exercises involving practices in Sand casting, Machining, Welding, Sheet metal fabrication techniques, CNC turning and milling exercises, Experiments on basic engineering metrology and measurements to include measurements for circularity, ovality, linear dimensions, profiles, radius, angular measurements, measurement of threads, surface roughness.
- Basic knowledge and derivations related to above measurements, uncertainties, statistical approaches to estimate uncertainties, Line fitting, static and dynamic characteristics of instruments will be discussed in laboratory classes.
- **Assignments:** Assignments for this course will include the topics: Manufacturing of micro-chips used in IT and electronics industry and use of touch screens. Another assignment will be given to practice numerical exercises on topics listed in the syllabus.
- **Micro Project:** Fabrication of multi-operational jobs using the above processes as per requirement by teams consisting of 4 -6 members. The use of CNC machines must be part of micro project. Quality check should be using the equipment available in metrology lab.

Course Learning Outcomes (CLO):

After the completion of this module, students will be able to:

1. develop simple CNC code, and use it to produce components while working in groups.
2. analyse various machining processes and calculate relevant quantities such as velocities, forces.
3. recognise cutting tool wear and identify possible causes and solutions.
4. understand the basic principle of bulk and sheet metal forming operations for analysis of forces.
5. analyse various shearing operations for tooling design
6. apply the knowledge of metal casting for different requirements
7. analyse and understand the requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials

Text books:

- M. P. Groover, Fundamentals Of Modern Manufacturing: Materials, Processes, and Systems, Wiley (2016), 5th edition.
- Degarmo, E. P., Kohser, Ronald A. and Black, J. T., Materials and Processes in• Manufacturing, Prentice Hall of India (2008) 8thed.
- Kalpakjian, S. and Schmid, S. R., Manufacturing Processes for Engineering Materials,• Dorling Kingsley (2006) 4thed.

Reference Books:

- Martin, S.I., Chapman, W.A.J. , Workshop Technology, Vol.1 & II, Viva Books (2006) 4 th ed.
- Zimmer, E.W. and Groover, M.P., CAD/CAM - Computer Aided Designing and Manufacturing, Dorling Kingsley (2008).
- Pandey, P.C. and Shan, H. S., Modern Machining Processes, Tata McGraw Hill (2008).
- Mishra, P. K., Non-Conventional Machining, Narosa Publications (2006).
- Campbell, J.S., Principles of Manufacturing, Materials and Processes, Tata McGraw Hill Company (1999).
- Lindberg, Roy A., Processes and Materials of Manufacture, Prentice Hall of India (2008) 4 thed.

Evaluation scheme

Sr. No.	Evaluation elements	Weightage (%)
1	MST	25
2	EST	40
3	Sessional: (May include the following) Assignment, Regular Lab assessment (Including report, presentation etc.), Quizzes, Minor Project	35

Thanks!!