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|--------------------|---|----------|----------|----------|----------|
| COURSE CODE | MACHINING AND MACHINE TOOLS TECHNOLOGY | L | T | P | C |
| 1151ME107 | | 3 | 0 | 0 | 3 |

1. Preamble

To impart knowledge on mechanics of metal cutting in conventional, special machines tools, NC, CNC Machines.

2. Pre requisite

Manufacturing Technology 1151ME104

3. Links to other Courses

- | | | |
|---|---------------------------------------|-----------|
| 1 | Computer Integrated Manufacturing | 1152ME106 |
| 2 | Tool Design Engineering | 1152ME118 |
| 3 | Industrial Engineering and Management | 1152ME108 |

4. Course Educational Objectives

Students undergoing this course will be able to:

- Understand the concepts and basic mechanics of metal cutting in standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding, gear cutting machines, broaching and allied machines.
- Understand the working principles of NC and CNC machine tools and CNC Programming

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

| COs | Course Outcomes | Level of learning domain (Based on revised Bloom's) |
|-----|--|---|
| CO1 | Explain the concepts related to metal cutting, tool geometry and tool materials. | K2 |
| CO2 | Understand the working principles of centre lathe and special purpose lathes. | K2 |
| CO3 | Explain the working principles of reciprocating machine, milling, drilling and gear cutting processes. | K2 |
| CO4 | Explain the surface grinding and cylindrical grinding operations. | K2 |
| CO5 | To gain the knowledge to program CNC machines for specific operations such as turning, drilling and milling. | K2 |

(K3-Apply)

6. Correlation of Course Outcomes with Programme Outcomes

| Cos | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | H | L | | | | | | | | | | L | M | L |
| CO2 | H | L | | | | | | | | | | L | M | L |
| CO3 | H | L | | | | | | | | | | L | M | L |
| CO4 | H | L | | | | | | | | | | L | M | L |
| CO5 | H | L | | | | | | | | | | L | M | M |

H- High; M-Medium; L-Low

7. Course Contents

UNIT I MECHANICS OF METAL CUTTING

L- 9

Introduction: material removal processes, types of machine tools – theory of metal cutting, cutting tool geometry, chip formation, orthogonal cutting, oblique cutting, cutting tool materials, tool wear, tool life, surface finish, cutting fluids.

UNIT II CENTRE LATHE AND SPECIAL PURPOSE LATHES

L- 9

Centre lathe, constructional features, various operations, taper turning methods, thread cutting methods, machining time and power estimation. Capstan and turret lathes – Turret Indexing mechanism, bar feed mechanism.

UNIT III RECIPROCATING MACHINES, MILLING, DRILLING & GEAR CUTTING

L-9

Reciprocating machine tools: Shaper, Slotter: Milling: types, milling cutter attachments, operations, Up & down milling, Types of milling cutters -- Gear cutting: Gear forming, Gear Hobbing- Drills, Reamer nomenclature- Hole making: drilling, reaming, boring, tapping, Broaching machines: Introduction to jigs & fixtures.

UNIT IV ABRASIVE PROCESSES

L- 9

Abrasive processes: grinding wheel – specifications and selection, types of grinding process – cylindrical grinding, surface grinding, centreless grinding, internal grinding- honing, lapping, super finishing, polishing and buffing, abrasive jet grinding.

UNIT V CNC MACHINE TOOLS AND COMPUTER AIDED PROCESS PLANNING

L-9

Numerical control (NC) machine tools – CNC: types, constructional details, special features. -Part programming fundamentals – manual programming – computer assisted part programming – Turning, Drilling and Milling. Introduction to Distributed Numerical control (DNC) Machines.
Introduction to computer aided process planning.

Total: 45 Periods

8. Text Books

1. Mikell P. Groover "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", 2012.
2. Rao. P.N "Manufacturing Technology - Metal Cutting and Machine Tools", Tata McGraw-Hill, New Delhi, 2013.
3. Kalpakjian, "Manufacturing Processes for Engineering Materials", Pearson education India, 1992

9. References

1. HMT – "Production Technology", Tata McGraw-Hill, 2010.
2. Philip F. Ostwald and Jairo Munoz, 'Manufacturing Processes and systems', John Wiley and Sons, 10th Edition, 2012.
3. M.P. Groover and Zimmers Jr., 'CAD/CAM' Prentice Hall of India Ltd., 2011.
4. Milton C. Shaw, "Metal Cutting Principles", Oxford University Press, Third Edition, 2012.