

NIRMA UNIVERSITY

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| Institute: | Institute of Technology |
| Name of Programme: | B.Tech. in Mechanical Engineering |
| Course Code: | |
| Course Title: | Manufacturing Processes-II |
| Course Type: | Core |
| Year of introduction: | 2024-25 |

| L | T | Practical component | | | | C |
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Course Learning Outcomes (CLOs):

After successful completion of the course, student will be able to –

- 1 select appropriate conventional and advanced machining process for a given application, (BL5)
- 2 interpret the effect of process parameters on different machining operations, (BL5)
- 3 design jigs and fixtures for a given component, (BL6)
- 4 develop part programs for CNC turning and machining centres. (BL6)

| Unit | Contents | Teaching hours (Total 45) |
|---------|--|------------------------------|
| Unit I | Conventional machining processes Introduction of machine tools, Classification, Working and auxiliary motions; Lathe, Shaper, Planning, Drilling and Milling: Types, Specifications, Process parameters, Construction, Attachments and Operations, Turrets and Automats, gear manufacturing processes, selection and applications. | 12 |
| Unit II | Advanced machining processes Introduction, Classification, Advanced machining processes namely Water Jet Machining, Abrasive Jet Machining, Ultrasonic Machining, Electric Discharge Machining, Electro Chemical Machining, Plasma Arc Machining, | 12 |

Laser Beam Machining and Electron Beam Machining: Principles, Variants, Elements, Process parameters, selection and applications.

Unit III Surface processing operations 07

Cleaning operations: Chemical and Mechanical, Coating operations: Plating, physical vapor deposition, chemical vapor deposition; Finishing operations: grinding, Lapping, Honing, Super-finishing, Polishing and Buffing, Gear finishing processes, selection and applications.

Unit IV Jigs and fixtures 07

Definition, usefulness in mass production; principles, methods, Types of locators, diamond pin locator, principles and types of clamps, jig bushes: purpose and types, Jigs and Fixtures for turning, milling, welding, and grinding applications.

Unit V CNC machining and additive manufacturing 07

CNC machine introduction, Classification, Hardware, Tooling, Programming for turning and machining centres. Additive manufacturing – basics, processes and applications.

Self – Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

- Suggested Readings/References:
- HMT, *Production technology*, Tata McGraw-Hill Education.
 - Groover M. P., *Fundamentals of modern manufacturing: materials processes, and systems*, John Wiley & Sons
 - Smid P., *CNC programming handbook: a comprehensive guide to practical CNC programming*, Industrial Press Inc.
 - Joshi P. H., *Jigs & Fixtures*, Tata McGraw Hill
 - Rao P. N., *Manufacturing technology: metal cutting and machine tools (Vol. 2)*, Tata McGraw-Hill Education.
 - Ghosh A. and Mallik A. K., *Manufacturing Science*, Pearson India.

Laboratory Work: Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

Suggested List of Experiments: (not restricted to the following)

(Only for Information)

| Sr. No. | Name of Experiment/Exercise | Hours |
|---------|---|-------|
| 1 | To prepare a practice job demonstrating various lathe operations. (Plain, Step and Taper Turning, Knurling and RH thread cutting on Lathe). | 04 |
| 2 | To prepare a practice job demonstrating various operations on shaper machine. (Machining a plane surface and V-groove on Shaper machine). | 04 |
| 3 | To manufacture a Spur Gear (Machining a Spur Gear on Milling machine). | 04 |
| 4 | To demonstrate surface finish operation using cylindrical grinding machine. | 02 |
| 5 | To identify tooling requirement through demonstration of Automate lathe machine and capstan lathe. | 02 |
| 6 | To demonstrate MRR and surface quality of the job on EDM machine. | 02 |
| 7 | To design a Jig and Fixture for a given product. | 04 |
| 8 | To prepare part programs for CNC turning and machining centres. | 02 |
| 9 | To prepare a component using additive manufacturing process. | 02 |