SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY 

| Department of Automobile Engineering | LP: AE22303 |
|---|---|
| B.E/~~B.Tech/M.E/M.Tech~~ : **Automobile Engineering** Regulation: **2022** | Rev. No: 00 |
| PG Specialisation : **NA** | Date: 27.07.2023 |
| Sub. Code / Sub. Name : **AE22303 – Manufacturing Technology and Systems** | |
| Unit : **III** | |

**Unit Syllabus: COMPUTER AIDED MANUFACTURING**

Introduction to NC systems and CNC - Machine axis and Co-ordinate system - CNC machine tools- Principle of operation CNC- Introduction of Part Programming, types - Detailed Manual part programming on Turning centres and Vertical Milling centres using G codes and M codes- Cutting Cycles, Loops, Sub program.

**Objective**: To interpret the applications of computers in the manufacturing and to develop part programming.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|---|---|---|---|
| 1 | Introduction to NC systems | R5 | PPT |
| 2 | Introduction to CNC | R5 | PPT |
| 3 | Machine axis and Co-ordinate system | R5 | PPT |
| 4 | CNC machine tools | R5 | PPT |
| 5 | Principle of operation | R5 | PPT |
| 6 | CNC- Introduction of Part Programming, types | R5 | PPT |
| 7 | Detailed Manual part programming on Turning centres using G codes and M codes | R5 | PPT |
| 8 | Detailed Manual part programming on Vertical Milling centres using G codes and M codes | R5 | PPT |
| 9 | Cutting Cycles, Loops, Sub program | R5 | PPT |
| **Content beyond syllabus covered (if any):** | | | |

* Session duration: 50 minutes

**Sub. Code / Sub. Name: AE22303 – Manufacturing Technology and Systems**

Unit : **I**

**Unit Syllabus: MACHINING**

General principles (with schematic diagrams only) of working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, Broaching machines, Cylindrical grinding machine, Capstan and Turret lathe. Super finishing processes.

**Objective:** To acquire knowledge on the working principles of various conventional machining process.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|---|---|---|---|
| 10 | General principles - Lathe | T1, T2 | PPT |
| 11 | General principles - Shaper | T1, T2 | PPT |
| 12 | General principles - Planer | T1, T2 | PPT |
| 13 | General principles - Horizontal milling machine | T1, T2 | PPT |
| 14 | General principles - Universal drilling machine | T1, T2 | PPT |
| 15 | General principles - Broaching machines | T1, T2 | PPT |
| 16 | General principles - Cylindrical grinding machine | T1, T2 | PPT |
| 17 | General principles - Capstan and Turret lathe | T1, T2 | PPT |
| 18 | General principles - Super finishing processes | T1, T2 | PPT |
| **Content beyond syllabus covered (if any):** | | | |

* Session duration: 50 mins

Sub. Code / Sub. Name: **AE22303 – Manufacturing Technology and Systems**

Unit : **IV**

**Unit Syllabus: UNCONVENTIONAL MACHINING PROCESSES**

General principles and applications of the following processes: Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Electro chemical grinding, Plasma arc machining, Chemical machining, Electron beam machining and Laser beam machining.

**Objective:** To acquire knowledge on the working principles of various unconventional machining process.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|---|---|---|---|
| 19 | General principles and applications - Abrasive jet machining | T1, T2 | PPT |
| 20 | General principles and applications - Ultrasonic machining | T1, T2 | PPT |
| 21 | General principles and applications - Electric discharge machining | T1, T2 | PPT |
| 22 | General principles and applications - Electro chemical machining | T1, T2 | PPT |
| 23 | General principles and applications - Electro chemical grinding | T1, T2 | PPT |
| 24 | General principles and applications - Plasma arc machining | T1, T2 | PPT |
| 25 | General principles and applications - Chemical machining | T1, T2 | PPT |
| 26 | General principles and applications - Electron beam machining | T1, T2 | PPT |
| 27 | General principles and applications - Laser beam machining | T1, T2 | PPT |
| **Content beyond syllabus covered (if any):** | | | |

* Session duration: 50 mins

Sub. Code / Sub. Name: **AE22303 – Manufacturing Technology and Systems**

Unit : **V**

**Unit Syllabus: ADVANCED MANUFACTURING PROCESSES AND SYSTEMS**

Group Technology (GT), Part Families - Parts Classification and coding - Cellular Manufacturing - Types of Flexibility - Flexible Manufacturing System (FMS) - FMS Components - FMS Application and Benefits.
Robot Anatomy - Classification of Robots - Robot Control systems - Sensors in Robotics - Industrial Robot - Applications, Additive Manufacturing, Lean Manufacturing.

**Objective:** To get awareness about the advanced concepts in manufacturing processes.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|---|---|---|---|
| 28 | Group Technology (GT), Part Families | R5 | PPT |
| 29 | Parts Classification and coding | R5 | PPT |
| 30 | Cellular Manufacturing | R5 | PPT |
| 31 | Types of Flexibility - Flexible Manufacturing System (FMS) | R5 | PPT |
| 32 | FMS Components - FMS Application and Benefits | R5 | PPT |
| 33 | Robot Anatomy - Classification of Robots | R5 | PPT |
| 34 | Robot Control systems | R5 | PPT |
| 35 | Sensors in Robotics - Industrial Robot - Applications | R5 | PPT |
| 36 | Additive Manufacturing, Lean Manufacturing | R5 | PPT |
| **Content beyond syllabus covered (if any):** | | | |

* Session duration: 50 mins

Sub. Code / Sub. Name: **AE22303 – Manufacturing Technology and Systems**

Unit : **II**

**Unit Syllabus: MANUFACTURING AND TESTING OF GEAR, SCREW THREADS**

Gear cutting - forming and generation principle and construction of gear milling, hobbing and gear shaping processes - finishing of gears. Thread Rolling.

Measurement of elements of screw thread and gear - techniques and measuring instruments - Screw thread Micrometers, Tool maker's microscope, Gear Tooth Vernier Caliper, Rolling gear tester, Co-ordinate measuring machine.

**Objective:** To interpret the different manufacturing and testing methods of gear.

| Session No * | Topics to be covered | Ref | Teaching Aids |
|---|---|---|---|
| 37 | Gear cutting - forming and generation principle | T1, T2 | PPT |
| 38 | Principle and construction of gear hobbing | T1, T2 | PPT |
| 39 | Principle and construction of gear shaping | T1, T2 | PPT |
| 40 | Principle and construction of gear finishing process | T1, T2 | PPT |
| 41 | Principle and construction of Thread rolling | T1, T2 | PPT |
| 42 | Measurement of elements of screw thread and gear - techniques and measuring instruments | T1, T2 | PPT |
| 43 | Screw thread Micrometers, Tool maker's microscope | T1, T2 | PPT |
| 44 | Gear Tooth Vernier Caliper, Rolling gear tester | T1, T2 | PPT |
| 45 | Co-ordinate measuring machine | T1, T2 | PPT |
| **Content beyond syllabus covered (if any):** | | | |

* Session duration: 50 mins

Sub Code / Sub Name: **AE22303 – Manufacturing Technology and Systems**

**TEXT BOOKS**

1. Hajra Choudhary S K, Hajra Choudhury A K and Nirjhar Roy, "Elements of workshop Technology", Volume II, Media promoters & Publishers Pvt. Ltd., 14th edition, 2014.
2. Rao. P.N "Manufacturing Technology: Metal Cutting and Machine Tools", 4thedition, McGraw Hill Education (India) Private Limited, New Delhi, 2018

**REFERENCES:**

1. I.C. Gupta, "A Textbook on Engineering Metrology", 7th Edition, Dhanpat Rai Publications, 2018.
2. Pandey P.C. and Shan H.S. "Modern Machining Processes" Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.
3. Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J. White "Machine Tool Practices", 10th edition, Pearson education, 2015.
4. HMT, "Production Technology", Tata McGraw-Hill Publishing Company Limited, NewDelhi, 2001.
5. Radhakrishnan P, Subramanyan S. and Raju V., "CAD/CAM/CIM", 2nd Edition, New Age International (P) Limited, New Delhi, 2004.

| | Prepared by | Approved by |
|---|---|---|
| Signature |  |  |
| Name | **Dr. K. PAUL DURAI** | **Dr. J. VENKATESAN** |
| Designation | Assistant Professor | HoD/AUT |
| Date | 27.07.2023 | 27.07.2023 |
| Remarks *: | | |
| Remarks *: | | |

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD