**Lesson Plan**

**Name of the faculty : Sombir**

**Discipline : Mechanical Engineering**

**Semester : 5th**

**Subject : CNC Machines and Automation**

**Lesson Plan Duration : 16weeks**

**Work Load : (L/P) (3 Periods/ 2 periods) /Week**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Theory** | | **Practical** |
| **Week** | **Lecture Day** | **Topics** | **Topics** |
| 1st | 1st | **Unit 1 Introduction-** Introduction to NC their advantages, disadvantages and applications. | Study of constructional detail of CNC lathe. |
| 2nd | Introduction to CNC their advantages, disadvantages and applications. |
| 3rd | Introduction to DNC their advantages, disadvantages and applications. |
| 2nd | 4th | Basic components of CNC machines, MCU. | Study of constructional detail of CNC lathe. |
| 5th | Input devices, selection of components to be machined on CNC machines. |
| 6th | Axis identification. |
| 3rd | 7th | **Unit 2 Construction and Tooling-** Design features, specification of CNC machines | Study the constructional details and working of:  Automatic tool changer and tool setter  Multiple pallets  Swarf removal  Safety devices |
| 8th | Use of slideways, balls, rollers and coatings, motor and leadscrew, |
| 9th | Swarf removal, safety and guarding devices |
| 4th | 10th | Various cutting tools for CNC machines, | Develop a part programme for following lathe operations and make the job on      CNC lathe and CNC turning center.(for finish pass only) – (At least two) |
| 11th | Concept of CNC tool holder, |
| 12th | Different pallet systems and automatic tool changer system |
| 5th | 13th | Management of a tool room | Calculating coordinate points for a cylindrical job by considering sign convention for lathe  Plain turning and facing operations |
| 14th | **Unit 3 System Devices-** Control System; |
| 15th | Open Loop and Closed Loop System |
| 6th | 16th | Concept of Actuators | Develop a part programme for the following milling operations and make the  joB  on CNC milling ( for finish Pass only)- At least two |
| 17th | **SESSIONAL I** |
| 18th | Transducers and Sensors |
| 7th | 19th | Tachometer | Calculate coordinate points for a zig zag job by considering sign convention for milling |
| 20th | LVDT |
| 21st | Opto-interrupters |
| 8th | 22nd | Potentiometers for linear and angular position, | Develop a part program by using canned cycle on CNC lathe for turning , facing |
| 23rd | Encoder |
| 24th | Decoder & axis drives |
| 9th | 25th | **Unit 4 Part Programming**-Introduction to Part programming | Preparation of work instruction for machine operator |
| 26th | Basic concepts of part programming |
| 27th | NC words, part programming formats |
| 10th | 28th | Simple programming for rational components | Preparation of preventive maintenance schedule for CNC machine |
| 29th | Part programming using conned cycles, |
| 30th | Subroutines and do loops, tool off sets |
| 11th | 31st | Cutter radius compensation | Demonstration through industrial visit for awareness of actual working of FMS in production. |
| 32nd | Tool wear compensation |
| 33rd | **SESSIONAL II** |
| 12th | 34th | **Unit 5 Problems in CNC Machines-** Common problems in CNC machines related to mechanical, electrical components | Use of software for turning operations on CNC turning center |
| 35th | Common problems in CNC machines related to pneumatic, electronic components |
| 36th | Study of common problems and remedies |
| 13th | 37th | Use of on-time fault finding diagnosis tools in CNC machines. | Use of software for milling operations on machine centres. |
| 38th | **Unit 6 Automation and NC system-** Concept of automation, emerging trends in automation |
| 39th | Automatic assembly, components of Automation & Types. |
| 14th | 40th | Overview of FMS, | FILE CHECK |
| 41st | Group technology, CAD/CAM and CIM. |
| 42nd | Automated Identification system |
| 15th | 43rd | concept of AI, Robotics | VIVA-VOCE |
| 44th | nomenclature of joints, motion |
| 45th | **SESSIONAL III** |