**USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY**

*Department of Mechanical Engineering*

 **LESSON PLAN: R31032**

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| **Academic Year** : 2016-17 | **Semester**  : V |
| **Course**: Metal Cutting & Machine Tools |
| **Class** : III B.TECH  | **Section** : A&B |
| **Date of commencement of Class work** :13/06/2016 | **Date of end of Class work** : 8/10/2016 |
| **Prepared By**: M. Rama Krishna, Asst Professor | **Approved By**: HOD |

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| **Lecture****No** | **Date (As per Academic calendar)** | **Topics to be covered** | **Actual****Date of completion** | **Remarks** |
|  |  | **UNIT – I****FUNDAMENTALS OF MACHINING** |  |  |
| 1 | **13.6.16** | Introduction |  |  |
| 2 | **14.6.16** | Elementary treatment of metal cutting theoryMetal cutting operations |  |  |
| 3 | **15.6.16** | Element of cutting process |  |  |
| 4 | **16.6.16** | Geometry of single point tool angles |  |  |
| 5 | **17.6.16** | Chip formation and types of chips |  |  |
| 6 | **18.6.16** | Built up edge and its effects chip breakers |  |  |
| 7 | **20.6.16** | Mechanics of orthogonal cutting – Merchant’s force diagram. |  |  |
| 8 | **21.6.16** | Applications |  |  |
| 9 | **22.6.16** | Cutting forces, cutting speeds |  |  |
| 10 | **23.6.16** | Feed, depth of cut, tool life, coolants, tool materials. |  |  |
| 11 | **24.6.16** | Problems |  |  |
| 12 | **25.6.16** | Revision and 1st assignment. |  |  |
|  |  | **UNIT – II****LATHE MACHINES** |  |  |
| 13 | **27.6.16** | Engine lathe – principle of working, specification of lathe, Functions of Lathe |  |  |
| 14 | **28.6.16** | Parts in detail |  |  |
| 15 | **29.6.16** | Types of lathe, Speed lathe, Bench lathe, Engine lathe, Capstan &turret lathe, Automatic lathes |  |  |
| 16 | **30.6.16** | Work holders tool holders, Lathe centers, Catch plates, carriers |  |  |
| 17 | **01.7.16** | Four jaw chuck, three jaw chuck, Universal chuck, magnetic chuck, Face plates, angle plates, mandrels |  |  |
| 18 | **02.7.16** | Box tools taper turning |  |  |
| 19 | **04.07.16** | Taper turning methods |  |  |
| 20 | **05.7.16** | Thread turning – for lathes and attachmentsHalf nut mechanism |  |  |
| 21 | **07.7.16** | Constructional features of speed gear box and feed gear box, Tumbler gear feed in reversing mechanismSliding key mechanism |  |  |
| 22 | **08.7.16** | Turret and capstan lathes – collect chucksPrinciple of Capstan & Turret lathe, Mechanism Push out type, draw in type, dead length type collect chucks |  |  |
| 23 | **09.7.16** | Other work holders – tool holding devicesStraight cutter holder, plane or adjustable angle cutter holder, Offset cutter holder, reamer holder |  |  |
| 24 | **11.7.16** | Box and tool layout |  |  |
| 25 | **12.7.16** | Principal features of automatic lathes |  |  |
| 26 | **13.7.16** | Classification |  |  |
| 27 | **14.7.16** | Single spindle and multi-spindle automatic lathes |  |  |
| 28 | **15.7.16** | Tool layout and cam design for automats. |  |  |
| 29 | **16.7.16** | Revision and 2nd assignment |  |  |
|  |  | **UNIT – III** |  |  |
|  |  | **SHAPING, SLOTTING AND PLANNING MACHINES** |  |  |
| 30 | **18.7.16** | Principles ofworking, Classification |  |  |
| 31 | **19.7.16** | Principal parts, Mechanisms, Crank and slotted mechanism, Quick return mechanism, Stroke length adjustment |  |  |
| 32 | **20.7.16** | Specifications, operations performedMachining horizontal , vertical surfaceCutting grooves, slots and key ways |  |  |
| 33 | **21.7.16** | Machining time calculations, Feed speed , cutting speed, Feed and depth of cut |  |  |
|  |  | **DRILLING & BORING MACHINES** |  |  |
| 34 | **23.7.16** | Principles of working, Importance of drilling machine |  |  |
| 35 | **25.7.16** | Specifications, Maximum size of drill, Table diameterMaximum spindle travel, Spindle speeds and feeds |  |  |
| 36 | **26.7.16** | Types, Sensitive drilling machine, Upright drilling machine, Automatic drilling machine  |  |  |
| 37 | **27.7.16** | Radial drilling, Gang driling machine, Deep hole drilling machine |  |  |
| 38 | **28.7.16** | Operations performedDrilling, Reaming, Boring, Counter boring, counter sinking, Tapping, lapping , grinding |  |  |
| 39 | **29.7.16** | Tool holding devices – twist drill, Sleeve, sockets, chucks, Tapping attachments, floating holder,Nomenclature of twist drill, center drill |  |  |
| 40 | **30.7.16** | Boring machines, Types, principle of working |  |  |
| 41 | **01.8.16** | Fine Boring Machines |  |  |
| 42 | **02.8.16** | Jig boring machine, Parts, types: vertical milling machine type, Planar type, jig boring operations |  |  |
| 43 | **03.8.16** | Revision and 3rd assignment |  |  |
| 44 | **04.08.16** | Revision |  |  |
| 45 | **05.08.16** | Revision |  |  |
| 46 | **06.8.16** | Revision |  |  |
|  | **08.8.16 To13.8.16** | **MID EXAMINATIONS-I** |  |  |
|  |  | **UNIT – IV****MILLING MACHINES** |  |  |
| 47 | **16.8.16** | Principles of working |  |  |
| 48 | **17.8.16** | Specifications, Working surface of the table, Maximum length of longitudinal cross & vertical travel of tableNo.of spindle speeds, No. Of feeds |  |  |
| 49 | **18.8.16** | Classification of Milling Machine, Column and knee type, Fixed bed type, Planar type, Special type |  |  |
| 50 | **19.8.16** | Principle features of horizontal, vertical and universal Milling Machine, Comparision of table movements |  |  |
| 51 | **20.8.16** | Machining operations |  |  |
| 52 | **22.8.16** | Milling keyways, slots, grooves, gear cutting |  |  |
| 53 | **23.08.16** | Types of cutters, Plain milling cutter, Side milling cutter, Metal slitting saw, End mill |  |  |
| 54 | **24.08.16** | Geometry of milling cutters |  |  |
| 55 | **26.8.16** | Methods of indexing, accessories to milling machines. |  |  |
| 56 | **27.8.16** | Direct indexing, simple indexing |  |  |
| 57 | **29.8.16** | Compound indexing, differential indexing, angular indexing |  |  |
| 58 | **30.08.16** | Problems |  |  |
| 59 | **31.08.16** | Revision and 4th assignment |  |  |
|  |  | **UNIT –V****FINISHING PROCESSES** |  |  |
| 60 | **1.9.16** | Theory of grinding, Types of grinding, |  |  |
| 61 | **2.9.16** | Classification of grindingmachines, Rough grinders, precision grinders |  |  |
| 62 | **3.9.16** | Cylindrical and surface grinding machines |  |  |
| 63 | **6.09.16** | Center type grinders, block diagram, parts |  |  |
| 64 | **7.9.16** | Tool and cutter grinding machines,Block diagram, parts operations |  |  |
| 65 | **8.9.16** | Different types of abrasives, bonds, Natural, emery, artificial, Virtified bond |  |  |
| 66 | **9.9.16** |  silicate bond, shellac bond |  |  |
| 67 | **10.9.16** | Specification and selection of a grinding wheel.Grit, grate, grain size |  |  |
| 68 | **13.9.16** | Lapping, Honing & Broaching operations |  |  |
| 69 | **14.9.16** | comparision to grinding. |  |  |
| 70 | **15.9.16** | Revision and 5th assignment |  |  |
|  |  | **UNIT-VI****JIGS & FIXTURES** |  |  |
| 71 | **16.9.16** | Principles of design of jigs and fixtures and uses |  |  |
| 72 | **17.9.16** | Study of component, location, machine, six point location of rectangular block |  |  |
| 73 | **19.9.16** | Classification of jigs & fixtures, Self locking |  |  |
| 74 | **20.9.16** | Classification of jigs & fixtures,Self locking |  |  |
| 75 | **21.9.16** | Principles of location and clamping, types of clamping & work holding devices |  |  |
| 76 | **22.9.16** | Screw clamp, flat clamp, pivoted clamp, latch clamp, Cam clamp, double acting clamp |  |  |
| 77 | **23.9.16** | Typical examples of jigs and fixtures. |  |  |
| 78 | **24.9.16** | Types of jigs: template jig, plate jig, diameter jig, channel jig, leaf jig, ring jig, box, jig |  |  |
|  |  | **CNC MACHINE TOOLS** |  |  |
| 79 | **26.9.16** | Cnc machines |  |  |
| 80 | **27.9.16** | Working principle |  |  |
| 81 | **28.9.16** | Classification |  |  |
| 82 | **01.10.16** | Constructional features of CNC machines |  |  |
| 83 | **03.10.16** | CNC controller |  |  |
| 84 | **04.10.16** | Types of motion controls in CNC machines |  |  |
| 85 | **06.10.16** | Applications of CNC machines. |  |  |
| 86 | **07.10.16** | Revision |  |  |
| 87 | **08.10.16** | Revision |  |  |

**TEXT BOOKS:**

1. Production Technology by R.K. Jain and S.C. Gupta.
2. Workshop Technology – B.S. Raghu Vamshi – Vol II

**REFERENCES:**

1. Metal cutting Principles by M.C. Shaw
2. Metal cutting and machine tools by Boothroyd
3. Production Technology by H.M.T. (Hindustan Machine Tools).
4. Production Engineering, K.C Jain & A.K Chitaley, PHI Publishers
5. Manufacturing technology II, P.N Rao
6. Technology of machine tools, S.F.Krar, A.R. Gill, Peter SMID, TMH (I)

**List the Course Out comes(Cos):**

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| Sub code | Sub Name | COs | Expected level of attainmentOn 5 scale |
| **R31032** | **METAL CUTTING & MACHINE TOOLS**  | 1. Apply cutting mechanics to metal machining based on cutting force and power consumption.
2. Operate lathe, milling machines, drill press, grinding machines, etc.
3. Select cutting tool materials and tool geometries for different metals.
4. Select appropriate machining processes and conditions for different metals.
5. Learn machine tool structures and machining economics.
6. Write simple CNC programs and conduct CNC machining.
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