

B.Voc Mechanical Manufacturing – SKH

1st Semester

SUBJECT: Fundamentals of Computer
CODE:
CATEGORY: General Education Component

Credit	Hours	Marks		
3	45	I	E	To
		15	35	50

Objectives

- The syllabus introduces students to basic information and communication technology and proper paradigms that need to be implemented to develop any kind of computer applications. The course will help in developing the basic technical skills by hands on experience.

Learning Outcomes

- Students will be able to the use the computer for basic purposes of preparing personnel/business letters, viewing information on Internet, sending mails, using internet banking services etc.
- Understand basic computer operations and ICT applications.
- Understand Network troubleshooting.
- Undertake data entry services

Unit	Topic	Key Learning
I	Introduction to Computer System:	1.1 What is Computer, Basic Applications of Computer; Block Diagram of Computer System 1.2 Input / Output Devices, Computer Memory, Concepts of Hardware and Software, Data and Information; Applications of IECT. 1.3 Computer Virus: Definition, Types of viruses, Characteristics of viruses, Anti-virus software, 1.4 Introduction to number system
II	Operating System	<ul style="list-style-type: none"> • Overview of operating system: Definition, Functions of operating system, Need and its services, Types of operating system, Batch Processing, Spooling, Multiprocessing, Multiprogramming • , Time-Sharing, On-Line Processing, Real-Time Processing Basics of window operating system • Comparison between DOS and windows, Switching between DOS and windows

		<ul style="list-style-type: none"> • Comparison between Unix and Windows
III	Understanding Office Applications	<ul style="list-style-type: none"> • Introduction to MS Word, Introduction to MS Excel and its applications, Introduction to MS PowerPoint, Menus, Shortcuts, • Document types, Formatting documents • spread sheet and presentations, working with Spreadsheets, Different templates, Macros, Mail merge
IV	Networking	<ul style="list-style-type: none"> • Network Technologies, Introduction to Internet and protocols: TCP/ IP, Network connecting devices, Topologies • HTTP, HTTPS DNS, Hub, Switches • Router, Repeater, Firewalls, Digital Signature.
V	Introduction to World Wide Web and ERP	<ul style="list-style-type: none"> • WWW and Web Browsers Introduction, Objectives, Concept of internet • Overview of search engines, popular search engines in use, Surfing the web and websites, Hosting your websites, Planning and Developing the websites, Internet service provider. • Defining ERP, Origin and Need for an ERP System, Benefits of an ERP System, ERP Tools and Software, ERP Selection Methods and Criteria, ERP Selection Process, ERP Vendor Selection, ERP Implementation Lifecycle, Pros and cons of ERP implementation, Factors for the Success of an ERP Implementation, Introduction to SAP

Suggested Readings:

Text Books

1. Computers and Beginners by Jain, V.K.;
2. Computer Fundamentals by Anita Goel, Pearson.

Reference Books

1. Introduction to Information Technology, Leon Tech World by Leon and Leon
2. Foundations of Computing, BPB Publication by Sinha, Kr. Pradeep and Preeti Sinha;
3. Word Processing and Typing by Sharon Spencer, Heinemann.
4. MS Office by S.S. Srivastava, Firewall Media.
5. Microsoft Office 2010 by Bittu Kumar, V & S Publications
6. Data Communication and Networking by Behrouz.A. Forouzan, McGraw Hill

Web Links<http://cec.nic.in/E-Content/Pages/default.aspx>

1st Semester

Subject Name: Fundamental of Computers

Lab

Paper Code: :

CATEGORY: General Education Component

Credit	Hours	Marks		
1	30	I	E	To
		35	15	50

List of Experiments

1. Troubleshooting
2. Practical based on to be exposed/shown various components and supposed how to switch on a computer.
3. Handling Boot Setup, Installation of Operating System, Connecting your client to server, User and Workgroup Handling, General Operating system handling and related topics.
4. WordPad, Notepad, Sticky Note, Snipping tool, Paint
5. M.S. Word
6. MS-Excel- Creating charts, Creating tables
7. MS-PowerPoint
8. MS-Outlook
9. Case study on Operating systems (Windows/ Ubuntu/ Android/ iOS)
10. Networking
11. Software: Preparatory and open domain

SUBJECT: Communication Skills

CODE:

CATEGORY: General Education Component

Credit	Hours	Marks		
3	45	I	E	To
		15	35	50

Objectives

- To inculcate in students professional and ethical attitude, effective communication skills, teamwork, skills, multidisciplinary approach and an ability to understand engineer's social responsibilities.
- To inculcate in students written communication skills.

Learning Outcomes

- The syllabus introduces students to have basic skill set of channelizing information, self-development, decision making and interpersonal skills.

Unit	Topic	Key Learning
I	Communication	<ul style="list-style-type: none">• Meaning of Communication, Importance of Communication, Types of communication. Process of communication• Communication network in an organization• Barriers to communication, Essentials of good communication
II	Remedial English Grammar Understanding and applying Vocabulary	<ul style="list-style-type: none">• Articles, agreement between verb and subject, uses of tenses, Modal and their uses, Prepositions.• One word substitutes, Synonyms and Antonyms Word formation:-Prefixes, Bases and Suffixes.
III	Listening Skills	<ul style="list-style-type: none">• The process of listening, Types of listening, Benefits of effective listening• Barriers to listening, listening to announcements at work place.
IV	Reading Skills	<ul style="list-style-type: none">• Process and methodologies of reading, Skimming and scanning, Levels of reading, Proofreading, Summarizing, Precise writing• Unseen comprehension passage, Note taking and reviewing• convert the given information into charts and graphs.
V	Writing Skills	<ul style="list-style-type: none">• Main Forms of Written Communication: Notices, Drafting an E-mail• Correspondence: Personal and Official, Notices,

		<ul style="list-style-type: none">• Technical Report Writing, Preparing agenda and minutes of meeting
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Suggested Readings:

- Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
- Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
- Prasad, P. Communication Skills, S.K. Kataria& Sons.
- Bansal, R.K. and J.B. Harrison. Spoken English, Orient Language.
- Roach Peter. English Phonetics and Phonology.
- A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.
- Prasad, P. The Functional Aspects of Communication Skills, Delhi.
- McCarthy, Michael. English Vocabulary in Use, Cambridge University Press.
- Rajinder Pal and PremLata. English Grammar and Composition, Sultan Chand Publication.
- Idioms & Phrases (English-Hindi), Arihant Publication (India) Pvt. Ltd.
- One Word Substitution, Dr. Ashok Kumar Singh, Arihant Publications (India) Pvt, Ltd

Subject Name Communication Skills Lab

Paper Code:

CATEGORY: General Education Component **List of**

Experiments:

Credit	Hours	Marks		
1	30	I	E	To
		35	15	50

1. Greeting and starting of conversation.
2. Nonverbal communication techniques during conversation.
3. Verbal communication techniques during conversation.
4. Group discussion.
5. Extempore public speaking.
6. Reading activity
7. Situational dialogues /Role play.
8. PPT presentation technique

1st Semester

Subject Name: Fundamental of Industrial Management and Safety

Paper Code:

CATEGORY: General Education Component

Course Objectives:

1. Understanding the knowledge of Quality Control, inspection and quality assurance management used in the organization.
2. Develop the skill for using tool and techniques for quality in Industry
3. Apply elementary knowledge of quality concepts for quality assurance.

Learning Outcome:

- 1 Students will be able to understand the daily management system related to Quality in the shop floor.
- 2 Students will be able to understand all the required processes, ensuring implementation of the same and providing basic inputs for its improvement.
- 3 Student will be able to ensure that the final products manufactured by is as per the quality norms set by the organization.
- 4 Student will able to solve different type of problems in their manufacturing processes.
- 5 Ensure implementation of 5S activities at the shop floor/ office area. Students will be able to analyses the root cause problems in the product & process by using different problem solving techniques.
- 6 Students will able to apply 5S and safety in their work place.

Credit	Hours	Marks		
		I	E	To
3	45	15	35	50

Unit	Topic	Key Learning
I	Concept of Quality, Quality Control and Inspection	1.1 Quality: Definition, History, Importance 1.2 Approaches to define Quality, Cost of Quality, Hierarchy of Quality Management 1.3 Introduction to Quality Control. 1.4 Inspection and its types.
II	Organizational Aspects of Quality Assurance	2.1 Quality Assurance (QA): Introduction, Definition, QA in different stages, Quality Planning. 2.2 ISO: Introduction, ISO 9000 series of standard, Benefits of ISO. 2.3 ISO 9001, Benefits of ISO 9001. 2.4 Quality survey: Scope, Types of audit, inspection methods, Quality budget

III	Problem solving tools and techniques	3.1 Definition of a problem 3.2 Type of problems, classification of problems 3.3 What is problem solving, barriers to problem solving 3.4 Problem solving tools: Introduction to Cause and effect diagram, Histogram, flow chart, Check sheets, Histogram, Pareto charts, Control charts, Scatter Diagram
IV	Total Quality Management	4.1 Basic concept of TQM 4.2 principles of TQM 4.3 Barriers to TQM implementation 4.4 leadership concepts 4.5 Introduction to TPM 4.6 Quality allied concept: KAIZEN, Poke yoke, JIT, CAPA
V	5 S and Safety	5.1 Detailed concept of 5S and safety used in Industries 5.2 Introduction to Integrated Management system

Suggested Readings:

1. Total quality Management by L.Sganthi & Anand A. Samuel, PHI Publication.
2. Total quality Management by Poornima M Charantimath, Pearson Publication.

Web Reference

www.slideshare.net/MALLURSB/unit-1-quality-total-quality-tqm
<http://smallbusiness.chron.com/quality-important-business-57470.htm>
<https://totalqualitymanagement.wordpress.com/2008/09/12/cost-of-quality>
<https://accountlearning.com/approaches-to-total-quality-management/>
<https://prezi.com/a8qypxkz5uee/hierarchy-of-quality-management>
www.asiainspection.com/quality-control-services/product-and-manufacturing-inspections
<http://whatis.techtarget.com/definition/quality-control-QC>
<http://searchsoftwarequality.techtarget.com/definition/quality-assurance>
www.slideshare.net/Genesys.../the-8-principles-of-quality-assurance-trainin
<http://electronicstechnician.tpub.com/14085/css/Qa-Forms-And-Records-113.htm>
<http://www.businessdictionary.com/definition/quality-planning.html>
<http://smallbusiness.chron.com/build-quality-assurance-program-12955.html>
<http://asq.org/learn-about-quality/iso-9000/overview/overview.html>
<https://www.isoqsltd.com/about-us/what-is-iso>
<https://www.iso.org/iso-9001-quality-management.htm>

Subject Name: Fundamental of industrial Management and Safety Lab

Credit	Hours	Marks		
1	30	I	E	To
		35	15	50

Paper Code:

CATEGORY: General Education Component

List of Experiments

- 1 Draw and Demonstrate the process flow diagram**
- 2 Draw and demonstrate problem statement, target /Goal Setting**
- 3 Draw and demonstrate Pareto diagram**
- 4 Draw and Demonstrate cause and effect diagram**
- 5 Data validation and why –why Analysis**
- 6 Identification and knowledge of different types of personal protective equipment used in Industry.**
- 7 To determine different type of accident occur in industry.**
- 8 To determine different types of first aid used in industry .**
- 9 To determine different types of electrical safety used in Industry.**
- 10 To determine different types of mechanical safety used in Industry.**
- 11 To determine different types of work safety used in Industry.**
- 12 To determine HIRA (Hazard identification and risk assessment) in industry.**

1st Semester

Subject Name: Engineering Graphics and drawing Lab

CATEGORY: Skill Education Component

Credit	Hours	Marks		
		I	E	To
4	120	70	30	100

OBJECTIVES

1. Understand and appreciate the importance of Engineering Graphics in Engineering
2. Understand the basic principles of Technical/Engineering Drawing
3. Understand the different steps in producing drawings according to BIS conventions

OUTCOMES

1. The student will become familiar with fundamentals of various science and technology subjects and thus acquire the capability to applying them
2. The graduates will become familiar with fundamentals of engineering design. Understanding the concept generation, design optimization and evaluation.
3. Students will be able to effectively design various engineering components and make process plan for the production.

SKILL SET

1. Projection of various components according to BIS specifications.
2. Assembly of data and information of various components in visualized way
3. Interpretation of technical graphics assemblies

CONTENTS

1. Introduction to drawing, lines and lettering:

- 1.1. Definition and classification of drawing
- 1.2. Drawing instruments such as; drawing board, drawing sheets, drafter.
- 1.3. Types of pencils, sheets, eraser etc.
- 1.4. Different types of lines(Straight line, inclined line and curved lines)
- 1.5. Practice engineering style for letters and numbers as BIS: SP:46-2003

Hands on training:

- Prepare drawing sheet by using different types of lines
- Prepare Drawing Sheet Using Alphabets.
- Prepare drawing sheet by Bisection of line, angle, arc.

2. Dimensioning and scale:

- 2.1. Importance of dimensioning
- 2.2. Types (i.e. chain, parallel and progressive etc.) and methods of placing dimensioning (i.e. aligned and unidirectional)
- 2.3. Principles of dimensioning and practice dimensioning technique as BIS: SP: 46-2003.
- 2.4. Free hand sketching of straight lines, circle, square, Polygons

Hands on training:

- To divide line of length 120mm into 9 equal parts
- Divide a circle into 12 equal parts by using engineering compass
- Prepare drawing sheet by free hand sketching.

3. Introduction to Projection:

- 3.1. Introduction to first and third angle projection
- 3.2. Introduction to projection of point, line and plane
- 3.3. Sectioning of solids

Hands on training:

- Practice for projection of point
- Practice for projection of line
- Practice for projection plane
- Practice for sectioning of different solids.

4. Isometric and Orthographic projection

- 4.1. Isometric drawing of simple geometric solids
- 4.2. Orthographic projection of simple geometric solids.

Hands on training:

- Prepare drawing sheet of orthographic projection
- Prepare drawing sheet of isometric projection.
- **Orthographic drawings of Bolts and Nuts, Bolted Joints, Screw threads, Screwed Joints.**

5. Geometric and dimensioning Tolerance

- 5.1 Component Drawing and interpretation
- 5.2 Geometric dimension and Tolerance
- 5.3 Introduction to software used in drawing

Hands on training:

- **Prepare drawing sheets by using GD&T in drawing**

Text Book

1. Engineering Drawing Plane and Solid Geometry : N.D. Bhatt and V.M. Panchal, Forty-
2. Fourth Edition 2002, Charotar Publishing House.
3. Engineering Drawing: Laxmi Narayan and Vaishwanar, Charotar Publishing House.
4. Engineering Graphics and Drafting: P.S. Gill, Milenium Edition, S.K. Kataria & Sons.
5. Engineering Graphics using AUTOCAD 2007 : T. Jeyapoovan,m First Edition 2002, Vikas Publishing House.

SUBJECT: Applied Mathematics

CODE:

CATEGORY: General Education Component

Credit	Hours	Marks		
		I	E	To
4	60	30	70	100

Objectives

1. Acquire knowledge in matrix theory, a part of linear algebra, which has wider application in engineering problems.
2. To make the student knowledgeable in the area of Permutation and combination, trigonometric functions and to solve engineering problems based on the above concepts.
3. To make the student knowledgeable with basic and applied mathematics for further application.

Learning Outcomes

- The graduates will become familiar with fundamentals of various Mathematical concepts.
- Students will be able to set up and solve linear systems/linear inequalities graphically/geometrically and algebraically
- Students will be able to formulate problems in the language of sets and perform set operations, and will be able apply the Fundamental Principle of Counting, Multiplication Principle.
- Solve equations and inequalities, both algebraically and graphically, and Solving and model applied problems.

Unit	Topic	Key Learning
I	Algebra	<ul style="list-style-type: none">• Set theory• Permutation and Combination• Binomial theorem (expansion without proof)• Types of functions – linear, quadratic, polynomial, exponential and logarithmic
II	Trigonometric functions	<ul style="list-style-type: none">• Review of ratio of some standard angles (0, 30, 45, 60, 90 degrees)• Addition, subtraction and product formulae• Multiple and submultiples angles (2A, 3A, A/2)• Height and distance
III	Determinants and matrix	<ul style="list-style-type: none">• Introduction to Determinant and matrices• Algebra of matrices (up to third order)• Inverse of matrix by Adjoint method (up to second order)• Solution of system of linear equations by Cramer's rule

IV	Differential calculus	<ul style="list-style-type: none"> • Rules of differentiation – simple standard forms (involving one variable) • Derivatives of algebraic and trigonometric functions • Differentiation of function of a function • Chain rule
V	Integral calculus	<ul style="list-style-type: none"> • Integral of standard forms • Simple integration by substitution • Integration by parts and by fractions (for linear factor only) • Evaluation of definite integrals

Suggested Readings:

- NCERT- 11th and 12th Mathematics.
- Advanced Engineering Mathematics, E. Kresyzig, John Wiley and Sons. (latest edition).
- Higher Engineering Mathematics, B.S. Grewal, Khanna Publications
- Advanced Engineering Mathematics, R.A Jain and S.R.K Iyengar. Narosa Publications.
- Engineering Mathematics, N.P Bali, Laxmi Publications.

Subject Name: Measurement of Meteorology

Credit	Hours	Marks		
		I	E	To
3	45	15	35	50

Paper Code:**CATEGORY:** Skill Education Component**Course Objectives:**

1. Understand metrology, its advancements & various measuring instruments
2. To study the fundamentals of modern measurement tools and laid standard procedures.
2. To study fundamentals of inspection methods and systems.
3. To acquaint with operation of precision measurement tools and equipment.

Learning Outcomes: Learner will be able to...

1. Explain different measuring instruments to measure the qualitative and quantitative characteristics of different mechanical components.
2. Evaluate quality of job, machine and instruments.
3. Perform calibration of measuring instruments.
4. Analyse parts/instruments for dimensional accuracy and functionality.
5. Describe functioning of force, torque, pressure, vibration and temperature measuring devices.
6. Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design.
7. Understand the objectives of metrology, methods of measurement, selection of measuring instruments, standards of measurement and calibration of instruments.

Unit	Topic	Key Learning
I	Introduction to Measurement	<ul style="list-style-type: none"> • Aim, Definition, types, need of inspection, terminologies Methods of measurements, units of measurement • Selection of instruments • Concept of error (systematic and random), sources of error, Measurement standards, calibration, statistical concepts in metrology.
II	Linear and Angular Measurements (to be taught partially in practical sessions)	<ul style="list-style-type: none"> • Linear instruments, Surface plates (size, accuracy and material), slip gauges, Length bars–Calibration of the slip gauges, dial indicator, micrometers. Bevel protractor, spirit levels, sine bar, angle Gauges • Comparators, their types, relative merits and limitation. • Miscellaneous measurements: • Taper & Radius measurement.

III	Measurement of Properties	<ul style="list-style-type: none"> • Temperature, Force, weight, Pressure & flow, Noise, Lux and vibrations, Concept of fitting, tightening and torquing in a line and its equipment.
IV	Screw thread and Gear teeth metrology: (To be taught partially in Practical Session)	<ul style="list-style-type: none"> • Screw Measurement: Introduction, screw thread terminology, screw thread measurement • Gear Measurement : Introduction, types of gears, gear terminology, Gear Teeth Measurement, errors in gears, advanced measurement of spur gear.
V	Linear Tolerancing and GD&T	<ul style="list-style-type: none"> • Limits, fits and tolerances: Interchangeability, selective assembly, limits, fit and tolerances, limit gauging, design of limit gauges, computer aided tolerancing • Measurement of GD&T parameters: Measurement of straightness, flatness, squareness, parallelism, roundness, cylindricity, non-contact profiling systems. • Interferometry • Measurement of surface finish: Introduction, terminology, specifying roughness on drawings, surface roughness parameters, factors affecting surface roughness, ideal surface roughness, methods, precautions, surface microscopy, surface finish software.

Text Book

Engineering Metrology, R.K. Jain, Khanna Publishers, Delhi, 2009.

Reference Books

Engineering Metrology, Gupta I.C., Dhanpat Rai Publications.

Engineering Metrology and Measurements, N.V.Raghavendra and L.Krishnamurthy, Oxford University Press.

Metrology and Measureemnt, Anand K Bewoor and Vinay A Kulkarni, McGraw Hill.

**Subject Name: Measurement of Meteorology
Lab**

Credit	Hours	Marks		
		I	E	To
1	30	35	15	50

Paper Code:

CATEGORY: Skill Education Component

Objectives:

1. To study the fundamentals of linear measuring instruments and their calibration.
2. To study fundamentals of inspection methods and systems.
3. To acquaint with operation of precision measurement tools and equipment's.
4. To study different gauges and instrument used at shop floor.

Learning Outcomes: Learner will be able to...

1. Apply inspection gauge and checking systems.
2. Demonstrate the understanding of measuring instruments and their principle.
3. Analyze simple parts for dimensional accuracy and functionality using different instruments.
4. Analyze importance of GD & T in quality maintenance.

Experiments-

1. To demonstrate dimensional measurement of given specimen using linear Measuring Instruments (Vernier calipers, scale, measuring tape, micrometer etc.)
2. To check bore diameter of given specimen using bore dial gauge.
3. To measure Gear parameters using flange micrometer and to learn various gear terminologies.
4. To demonstrate measurement of various screw thread parameters using instruments and gauges. (Thread ring gauge, Pitch gauge, Bench micrometer etc)
5. To measure intensity of light in a room for different conditions using lux meter and analysis of the result.
6. To study various gauges used in industry for inline inspection such as Feeler gauge, snap gauge, ring gauge, plug gauge, calipers and other similar gauges.
7. To check and demonstrate inspection of Outer Diameter and Internal Diameters of given components using Air pressure gauges.
8. To measure angle of a given specimen using Slip gauges and Sine bar.
9. To demonstrate Coordinate measuring machine.
10. To measure total composite error (TCE) and Teeth to Teeth error (TTE) for given gear specimen using gear roll tester/Parkinson gear tester.
11. To perform spindle alignment test on lathe using dial gauge.
12. To perform spindle alignment test on milling.

Student need to perform atleast 8 experiments from above list.

SUBJECT: Work Shop Technology

CODE:

CATEGORY: General Education Component

Credit	Hours	Marks		
		I	E	To
3	45	15	35	50

Learning Outcomes

- Exposure to mechanical workshop layout and safety aspects.
- Understand the functions of various machines and cutting tools used in machine shop
- Practical real time job preparation using various operations related to machine shop such as filing, drilling, milling, turning, grinding, welding etc.
- Practice job preparation on welding shop.
- Learn to use different measuring tools like vernier calliper, micrometer, height gauge etc.
- Practice job preparation in fitting shop

Unit	Topic	Key Learning
I	Introduction to Manufacturing and Metal cutting	<ul style="list-style-type: none">• Definition of manufacturing process, its classification types, primary and secondary manufacturing processes• selection of a manufacturing process, types of production. Machine Tools; Definition,• its functions and classification, introduction to machining operations and common features of metal cutting• Definition and working principle of single point cutting tool, geometry of single point cutting tool, tool signature, orthogonal and oblique cutting• chips formation, types of chips, Cutting parameters- Cutting speed, feed and depth of cut.
II	Cutting Tool Materials, Surface coating & Introduction to welding processes	<ul style="list-style-type: none">• Properties and uses of cutting tool material viz; High-speed steel, tungsten carbide, cobalt steel cemented carbides, ceramics and diamond• Introduction, Function and its types, Specification and selection of cutting fluid• Surface coatings, types, composition of the paints and purpose of usage.• Electric arc welding: working principle, use of AC and DC current in welding• TIG welding, MIG welding, Introduction to gas welding.
III	Lathe and Grinding machines	Introduction, working principle, its construction and specifications.

		<p><i>Lathe classification</i>; Bench, Tool room, Capstan and Turret, Automatic and Special purpose lathes.</p> <ul style="list-style-type: none"> • <i>Lathe Operations</i>: Plain and step turning, Taper turning; taper calculations, methods of taper turning, parting off, drilling, boring, knurling • Screw cutting on lathe-introduction to right and left threads, lathe setting for screw cutting-simple and compound gear trains • Cutting parameters- Speed, feed and depth of cut, machining time. • <i>Lathe Accessories</i>: Centres; live and dead centre, Chucks; three jaw universal chuck, four jaw independent chuck, magnetic chuck, air or hydraulic chuck, Lathe carriers or dogs • Driving plate, Face plate, angle plate, mandrels, rests; steady and follower. • <i>Lathe Attachments</i>; Grinding attachment, Milling attachment, Taper turning attachment • Introduction- Abrasive tools, stones and sticks, grinding wheels– materials, specifications, selection of grinding wheels • Trucing and dressing of grinding wheels, abrasives-natural and artificial, speed, feed and depth of cut, use of coolants • <i>Types of grinding machines</i>; cylindrical grinders, surface grinders, centreless grinders, special grinding machines
IV	Drilling, Reaming and Boring machines	<ul style="list-style-type: none"> • Introduction, tools for drilling, its classification, twist drills, twist drill parts and terminology, some important drill dimensions and important angles of drill, drill size and specifications, straight flute drills, • <i>Drilling machine types</i>; Portable, Bench, Radial, Universal, Multiple spindle, Gange, Horizontal and automatic drilling machines • <i>Drilling machine operation</i>; Drilling, Spot facing, Reaming, Boring, Counter boring, Counter Sinking, tap drill size • <i>Drilling machine operation</i>; Drilling, Spot facing, Reaming, Boring, Counter boring, Counter Sinking, tap drill size • Reaming Machine; Introduction, Reamer terminology, Types of reamers-hand reamers, machine reamers, adjustable and taper reamers • Boring Machines: Introduction, Horizontal boring machines, Vertical boring machines

V	Milling machines and Introduction to Jigs & Fixtures	<p>Introduction, working principle, principal parts, Size and specification, up milling and down milling,</p> <p><i>Milling machine types:</i> Column and Knee type-hand, plain or horizontal, vertical, universal, Universal milling machine, Planer type milling machine or plan mill.</p> <p><i>Milling cutters:</i> Plain, Side, End, Face, Metal slitting, Angle milling, Form milling, Woodruff-Key and T-slot milling cutters, Materials for milling cutters, cutting speed and feed.</p> <ul style="list-style-type: none"> • Milling operations; Plain or Slab, Face, Angle, Form, Straddle and Gang, Slot and Groove, Keyway, Side, End, Profile, Gear milling operations • Importance and use of jigs and fixtures, types of jigs, principle of location, locating and clamping devices, advantages of jigs and fixtures
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Suggested Readings:

1. Comprehensive Workshop Technology (Manufacturing Processes), by S. K. Garg, Laxmi Publication
2. Elements of Workshop Technology, S. K. Hajra Choudhury, Hajra Choudhury A K

Reference Book:

1. Production Technology by R. K. Jain, Khanna Publishers

SUBJECT: Work Shop Technology Lab

CODE:

CATEGORY: General Education Component

Credit	Hours	Marks		
1	30	I	E	To
		35	15	50

Objectives

Learning Outcomes

- Exposure to mechanical workshop layout and safety aspects.
- Understand the functions of various machines and cutting tools used in machine shop
- Practical real time job preparation using various operations related to machine shop such as filing, drilling, milling, turning, grinding, welding etc.
- Practice job preparation on welding shop.
- Learn to use different measuring tools like vernier calliper, micrometer, height gauge etc.
- Practice job preparation in fitting shop.

List of Practicals

1. To prepare jobs in fitting shop
2. To prepare jobs on Lathe machine
3. To prepare job on milling machine
4. To prepare job using TIG and MIG welding
5. Prepare job on drilling machine
6. To prepare job on surface grinder

Credit	Hours	Marks
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SUBJECT: Introduction to CNC Machines Lab

CODE:

CATEGORY: Skill Education Component

4	120	I	E	To
		70	30	100

Objectives

To make students in depth knowledge about CNC Machines, Machine setting , Tools used , tool offset and setting of CNC Machines.

Learning Outcomes

- 1.To be able to differentiate between conventional & CNC Machine in respect to working, components, operation.
2. To have an understanding of setting up of tooling for CNC. One should have knowledge of types of cutting tools & tool material used.
3. To have an understanding of tool & work holding devices used & locating principle
4. To take tool offsets and work-offset on CNC machine.

List Of Experiments

1. Introduction to CNC and Understanding of Panel board.
2. Types of programs like Fanuc, Siemens, Mitsubishi, Allen Bradley etc.
3. Movement of Axis, tool change, use of hands wheel, Jog and manual data input.
4. Study of ATC with demonstration and Setting and adding new tool in ATC.
5. Practically finding out tool parameters on tool presetter machine.
6. Finding out coordinates for work and tool.
7. Performing tool offset for milling machine.
8. Performing Work offset for milling machine
9. Performing tool offset for Lathe machine.
10. Performing Work offset for Lathe machine.

Process

1. Interpretation and understanding of the component Drawing
2. To conceptualize the process based on location points, resting points and clamping points. Which surfaces and operations (drilling, milling, tapping, boring, reaming, to be done.
3. Writing down detail process operation by operation using different jigs and fixtures as conceptualized.
4. Organising fixtures tools , toolings, material for machining the component.

Preparing machine for production

1. Select or write the program for machining the component.
2. Arranging the tools and setting them on presetters.
3. Loading the tools on Auto tool changer as per the program
4. Load the fixture