CERTIFICATE COURSE IN MACHINE OPERATION (CCMO)

Ministry of Micro, Small and Medium Enterprises, New Delhi
(MSME-Technology Centre)

COURSE NAME: **CERTIFICATE COURSE IN MACHINE OPERATION**

COURSE CODE:

SUBJECT NAME: **PRACTICAL LAB**

OUTCOMES:

After completion of course Student should be able to:

- Explain various machine tools and their principle functions.
- Describe proper safety rules and environment regulation and housekeeping in machine shop.
- Explain different cutting tools, accessories, instruments used.
- Explain sequence of machining operations.
- Develop their skill & knowledge on operating of conventional machines (Bench Work- filling, layout, sawing, punching, using of tools & instruments.
- Set machining parameter with all relevant calculation.
- Perform various drilling operation, reaming operations, tapping operation using suitable tools, accessories, and measuring instruments.
- Perform various machining operations on lathe machines for manufacturing job using suitable tools, accessories and measuring instruments.
- Perform various machining operations on Milling Machines for manufacturing of job using suitable tools, accessories and measuring instruments.
- Perform various machining operations on Grinding Machines for manufacturing job using suitable tools accessories and measuring instruments.

- Understand and follow basic maintenance work of machines, machineries and instruments.

THEORY HOURS: **PRACTICAL HOURS: 1150 (including project)** **THEORY MARKS: -** **PRACTICAL MARKS: 400**

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Practical hours	Internal Marks	Exam. / Project Marks
UNIT-I	Introduction to machine shop, instruments, tools, machineries , machine tools and machining technology	After completion of unit Student should be able to Develop their skill & knowledge - on Bench work and operating of drilling machines - Demonstrate and explain Bench Work- filling, layout, sawing , punching , using of tools &instruments , drill machine and performing of drilling operations , tapping using	Introduction to Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Introduction to Bench work, tools, machineries, instruments, machine tools. Performance on Bench work and drilling Machines**.** Introduction and Identify the parts of a file, hammer, chisel, punch, hacksaw, bench vice, and their uses and all features. Identify the features of a steel rule, divider,	200	30	

		suitable tools accessories, and measuring instruments - Appropriate parameters setting of drilling, reaming operations - operation sequence for the operations	try square and its uses. Identify vernier caliper, common gauges and its uses. Select material piece, study the drawing of exercise job Practice sawing, Filing work etc. Layout and marking of job using surface plate, height gauge, angle plate, vee block, vernier caliper, scriber etc. Marking as per drawing Identify & select of drill machine, vice or clamp holding devices, Drill chuck, sleeve, etc. Knowing of belt drive and gear drive. Centre punching, setting of job on machine. Setting parameter on machining. Operation of Centre drilling, drilling, counter sinking, Counter boring, reaming, boring, etc. using coolants. Selection of tap, parameter setting and tapping using lubricating oil. Inspecting of job by measuring tool, gauges. Cleaning of machine and oiling.			
UNIT-II	Performing various machining practices on Lathe machines	After completion of unit Student should be able to understand and develop their skill and knowledge on - Lathe Machine and performing of different operations on lathe machine for manufacturing a job using suitable tools, accessories, and measuring instruments. - Appropriate parameters setting	Introduction to Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Introduction to Lathe Machine : Identify and knowing the functions, features and uses of different parts of a lathe machine. Study the drawing, identify and select material, machine, tools, & measuring instruments.	300	30	

		of lathe operations - operation sequence for the lathe operations	Formation of cutting tool. Setting of job and machining parameter Setting of cutting tool to the centre height. Operation carried out on facing, centre drilling, drilling, turning, step turning, grooving, knurling thread cutting, taper turning and checking its taper, Parting off, chamfering, boring, etc.			
UNIT-III	Performing various machining practices on Milling Machines	After completion of unit Student should be able to understand and develop their skill and knowledge on - Milling Machine and performing of different operations on milling machine for manufacturing a job using suitable tools, accessories, and measuring instruments - Appropriate parameters setting of milling operations - operation sequence for the milling operations	Introduction to Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Identify and knowing the function and features and uses of different parts of a milling machine. Study the drawing, identify and select material, machine, tools, & measuring instruments. Selection of different milling cutters for specific operation. Setting and dialing of job and setting of machining parameter, Operation carried out on surface milling, open & close slot milling, angle milling, form milling, vee slot milling, narrow slot milling, 'T'- slot milling, dovetail milling etc. Use of machine vice,'T' bolt clamps, vee block, rotary table, indexing devices, etc. Uses of cutter holding device like arbour, collets, adapters, spring collect etc. Inspecting of job by measuring tool, gauges. Cleaning of machine and oiling.	300	30	
UNIT-IV	Performing various machining practice on	.After completion of unit Student should be able to understand and develop their skill and knowledge on	Introduction of Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident.	200	30	

	Grinding Machines	- Grinding Machine and performing of different operations on grinding machine for manufacturing a job using suitable tools accessories, and measuring instruments - Appropriate parameters setting of grinding operations - operation sequence for the grinding operations	Identify and knowing the function and features and uses of different parts of a grinding machine. Study the drawing, identify machine, tools, & measuring instruments. Selection of different grinding wheel for specific operation. Setting and dialling of job and setting of machining parameter, Setting and dialling of job and setting of machining parameter. Operation carried out on surface grinding , slot grinding, angle grinding , form grinding , vee slot grinding , narrow slot grinding, external and internal cylindrical grinding etc. uses of sine table, magnetic vice, stick dresser , sitting dresser, etc. Use of Jigs and Fixture tool to perform specific operation Inspecting of job by measuring tools and gauges. Cleaning of machine and oiling. Development of skill on performing of Inspection and checking for all operations on jobs as per design and drawing specifications with the help of different and appropriate measuring instruments and gauges.			
UNIT-V	practical Examination on lesson	After completion of unit Students will be evaluated on their level of competency of performance on operating conventional machine tools. Project/Practical test will be assigned to individual student in order to access skill and knowledge on their trade training curriculum.	Performing of assigned work by identifying and selecting all relevant items in order to complete the job as per specification with in stipulated time period. Preparation of job process sequence sheet.			180

UNIT-VI	Project Work	During the session of learning, students are assigned with specific job to be carried out by them in individual / in group responsibility.	Performing of assigned project work by identifying and selecting all relevant items in order to complete the job as per specification with in stipulated time period. Preparation of project report.			100

COURSE NAME: CERTIFICATE COURSE IN MACHINE OPERATION

COURSE CODE:

SUBJECT NAME: MACHINE SHOP THEORY

COURSE OUTCOMES: The aim of this course student should be able to:

- Identify working principle of hand tools and their uses.
- Describe working principle of conventional machine tools, function of various machine tools and their field of applications.
- Identify method of machining and sequence of operations.
- Identify the function of instruments, accessories and attachments used.
- Identify various machining operation techniques.
- Describe basic maintenance of machines, machineries, accessories, and instruments.
- Identify safe working practice and environment regulation and housekeeping.

THEORY HOURS:**200** PRACTICAL HOURS: THEORY MARKS: **200** PRACTICAL MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Theory hours	Internal Assessment (Marks)	Final Examination (Marks)
UNIT-I	Basic Trade theory on Bench work, drilling.	At the end of this Unit the student should be able to: • Understand the importance of safety rule in machine shop. • Understand various feature of safety • Describe and classify hand tools • Describe and classify machine tools • Describe and classify measuring instruments • Describe and classify accessories • Describe machines and function of machine parts • Machining parameter setting and calculation	Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Designation of a file, parts of a file, kinds of file. Types of hammer, parts of a hammer, material of hammer, material of handle. Common types of chisel, designation, material, hardness, cutting angles for different metals. Centre and Dot Punch. Parts of a Hacksaw Frame and Blade, kinds of metal cutting Blade, Types of Blade, Material of Blade, Hardness of Blade, Selection of Blade, Standard Blades, Classification of Blade. Types of vices, parts of a bench vice, designation of a bench vice. Filing method, grasping of the file, fixing of the blade in the hacksaw, Sawing method, holding	50	20	30

			of chisel, How to fit handle in a hammer, Calculating the force of a hammer blow. Description of a surface plate and its material, description of a angle plate and its type, description and uses of a vee block. Marking and Marking Tools: Equipment and Instruments-Surface plate, Marking Table, Scriber, Divider, Trammel, Prick Punch, Centre Punch, Surface Gauge. Marking Methods- Vee Block, Combination Set, Angle Plates. Types of drill machine, specification of a drill machine, uses of angle plates, c- clamps, T bolts, sockets or sleeves, drill chuck , drill drift. Definition of Cutting speed and feed of drill, Calculating cutting speed and drilling time. Types of drill, parts of a twist drill, sharpening of drill, process of centre drilling, counter sinking, counter boring. Parts of a reamer, Types of a reamer, selection of a reamer, proper use of reamer, causes of excessive wear and breakage of reamers, reaming of tapper holes, care of reamer. Properties and uses of coolants. Description of tap, Kinds of tap, method of tapping, calculation for tap drill size. Description of die, Kinds of die, method of using die for cutting thread. Description of lubricating soluble and machine oil, grease. Sessional examination to test basic theoretical knowledge on machine shop theory.			
UNIT-II	Basic Trade theory on	At the end of this Unit the student should be able to:	Safety work rules and precautions to be maintained in the work shop, housekeeping,	50	20	30

	Lathe machines.	• Understand the importance of safety rule in machine shop. • Understand various feature of safety • Describe and classify Lathe machine • Describe and classify cutting tools • Describe and classify measuring instruments • Describe and classify accessories , attachments • Describe machines and function of machine parts of lathe • Describe various turning operations • Machining parameter setting and calculation	causes of accident. Definition of lathe, function of lathe, types of lathe, specification of lathe. Lathe cutting tool nomenclature. Influence of tool angles. Use of Pedestal grinder. Description and function of lathe parts – bed, headstock, tailstock, carriage, feed mechanism, screw cutting mechanism. Lathe accessories and attachments – lathe centres, carriers and catch plates, chucks, face plates, mandrel, rests. Lathe operation – straight turning, shoulder turning, taper turning, eccentric turning, facing, chamfering, thread cutting, knurling, polishing, grooving, spinning, forming, drilling, reaming, boring, counter boring, taper boring, internal thread cutting, tapping, parting off, undercutting, Calculation for taper turning and thread cutting. Taper turning method: by a broad nose, form tool, by setting over the tail stock method, by swiveling the compound rest, by a taper turning attachment, by combining longitudinal cross feed in a special lathe. Standard taper. Definition and types of thread and their applications, pitch, lead, helix angle, Change gears calculation for cutting threads. Checking of taper surface by roller and dialing method. Surface finishing with emery cloth. Definition of limit, fit, tolerance.			

			Sessional examination to test basic theoretical knowledge on machine shop theory.			
UNIT-III	Basic Trade theory on Milling machines.	At the end of this Unit the student should be able to: • Understand the importance of safety rule in machine shop. • Understand various feature of safety • Describe and classify Milling machines. • Describe and classify cutting tools • Describe and classify measuring instruments • Describe and classify accessories , attachments • Describe machines and function of machine parts of milling machine. • Describe various milling operations • Machining parameter setting and calculation	Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Definition of milling, Type of milling machine- column and knee type, manufacturing of fixed bed type, planer type, special type. Principle parts- base, column, knee, saddle, table, overhanging arm, front brace, spindle, arbor. Milling machine mechanism, Specification of a milling machine. Work holding devices- T- bolts and clamps, angle plates, vee blocks, vices. Cutter holding devices – arbors, collets, adapters, spring collets, bolted cutters, screwed on cutters. Types of attachments – Universal head , high speed, vertical milling , etc. Types of milling cutters – plain milling cutter, side milling cutter, end mill etc. Milling cutter nomenclature. Types of milling process – up milling, down milling etc. Type of milling operation - plain milling, gang milling, face milling, side milling, gear cutting. blind slot milling etc. Definition of cutting speed , feed, and depth of cut.	50	20	30

			Calculation of machining time. Definition of indexing, types of indexing – direct, plain, compound, differential, angular indexing. Features of indexing device, Rotary table. Inspection of milling operations with the help of suitable measuring tools. Sessional examination to test basic theoretical knowledge on machine shop theory.			
UNIT-IV	Basic Trade theory on Grinding machines.	At the end of this Unit the student should be able to: • Understand the importance of safety rule in machine shop. • Understand various feature of safety • Describe and classify Grinding machines • Describe and classify cutting tools • Describe and classify measuring instruments • Describe and classify accessories , attachments • Describe machines and function of machine parts of grinding machines. • Describe various grinding operations. • Machining parameter setting and calculation.	Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Definition of Grinding, Kinds of grinding- Rough grinding , precision grinding. Types of grinding machines – Surface and Cylindrical grinder. Specification of grinding machines. Work holding devices and attachments. Grinding operations – flate surface, taper surface , cylindrical surface. Grinding allowance and tolerance. Grinding wheel – Abrasive, bonds, Grade, structures, grain size. Wheel shape and size , Mounting of wheel, Specification of grinding wheel, Selection of grinding wheel. Balancing of wheel, Dressing and truing of wheel. Types of dressing tools. Cutting speed, feed, machining time. Angle grinding – Use of sin table, use of slip gauge, Dial indicator.	50	20	30

			Inspection of grinding operation- Definition of Jigs and Fixture, Types of Jigs and Fixture. Sessional examination to test basic theoretical knowledge on machine shop theory.			

COURSE NAME:CERTIFICATE COURSE IN MACHINE OPERATION

COURSE CODE:

SUBJECT NAME : ENGINEERING METROLOGY

COURSE OUTCOMES: The aim of this course student should be able to:

- Demonstrate the Working Principles of measuring instruments and their types and uses
- Know the Selection of measuring instruments and their Functions and applications
- Identify the difference between measuring instruments and gauges
- The Techniques of different measurement
- Understand Limit, fit, Tolerance.
- Apply safe working practices with measuring instruments.

THEORY HOURS:**100** PRACTICAL HOURS: THEORY MARKS: **100** PRACTICAL MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Theory hours	Internal Assessment (Marks)	Final Test (Marks)

UNIT-I	Metrology - measuring Instruments , gauges	At the end of this Unit the student should be able to: • Understand the importance of metrology. • Safety use of measuring instrument. • Understand various feature of measuring instruments • Describe and classification of measuring instruments • Least count of measuring instruments • Measuring errors • Application of various instruments • Material of measuring instruments	Safety work rules and precautions to be maintained in the work shop, housekeeping, causes of accident. Definition and concept of Metrology, Need of Inspection, Principles of measurements, Process of measurements, Methods of measurements, Measuring and accuracy of measurement, Precision and accuracy, Errors in measurements. Description of Measuring Tools- Steel Rule, Divider, Calipers, Straight Edge, Try Square. – Definition and their material, designation, and uses, Precision Instruments- Outside Micrometer, Vernier Caliper, Height Gauge, Vernier Depth Gauge, Vernier Bevel Protector, Dial Test Indicator. Introduction of verniercalliper, main parts of a vernier caliper, how to read the verniercalliper in millimetre and inches, how to use vernier caliper- Least count. Calibration of error in reading. Checking radius with a radius gauge, checking gap with filler gauge, checking thread with plug gauge and ring gauge. Description of a vernier height gauge, how to set measurement in it. Classification and uses of slandered gauges pitch gauge, snap gauge, angl e gauge, vernier bevel protector, depth gauge etc. Description of Micrometer (inside, outside, depth-least count and calibration), bore dial gauge, pitch gauge. Dial gauge, slip gauge etc	50	20	30

UNIT-II	Metrology – measuring Instruments , gauges.	At the end of this Unit the student should be able to: • Understand Limit – Fit – Tolerance • Limit gauge • Taper / angular measurement • Measuring machines • Application of different gauges • Surface finish symbol	Limit Gauges- Plug Gauge, Ring Gauge, Snap Gauge, Telescopic Gauge, Radius Gauge, Angle Gauge, Screw Pitch Gauge, Filler Gauge, Wire Gauge, Drill Point Gauge, Bevel Gauge, Length Gauge, Bore Gauge, Drill Gauge, Centre Gauge, Profile Projector, Sine Bar. Angular Measurements. Geometric shapes Limits, Fits and Tolerances: - Introduction of Limits, Fit, Tolerance, Unilateral Tolerance, Bilateral Tolerance, Relation between Tolerance and cost, Maximum and Minimum limit, Conventional diagram of Limits, Fits and Tolerance, Terminology of limits and Fits, Types of Fits (Clearance, Interference, Transition Fit), Allowance, Hole basis system, Shaft Basis System, Standard limit system. Surface Texture, Name and uses of measuring machines. CMM. Sessional examination to test basic theoretical knowledge on Engineering Metrology. Checking of taper surface by roller and dialing method. Surface finishing with emery cloth. Sessional examination to test basic theoretical knowledge on machine shop theory.	50	20	30

COURSE NAME: CERTIFICATE COURSE IN MACHINE OPERATION

COURSE CODE:

SUBJECT NAME : ENGINEERING DRAWING

COURSE OUTCOMES: The aim of this course student should be able to:

- Making geometrical figures using drawing instruments.
- Free hand sketching of machine parts.
- Apply dimensions and Style in dimensioning.
- Know the Drawing Scale.
- Draw and understand Sectional views showing Orthographic, Isometric and Oblique projection.
- Draw and understand Projection and surface development of solid blocks and machine parts.
- Draw and understand different fasteners and locking devices as per standard.
- Drawing machine parts with tolerance dimension and surface finish symbol.
- Drawing of detailed and assembled production and process tools with conventional sign and symbols.

THEORY HOURS: **80** PRACTICAL HOURS: **270** THEORY MARKS: **100** PRACTICAL MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Theory hours	Practice hours	Internal Assessment (Marks)	Final Test (Marks)
UNIT-I	Basic Engineering Drawing – Geometric constrictio n	At the end of this Unit the student should be able to: • Understand the importance of understanding the engineering drawing • Handle drawing instruments • Draw free hand sketches • Draw geometric construction • Apply drawing dimensions Know the drawing scale and title block	Meaning of Engineering Drawing, Drawing Instruments and its uses, Drawing boards designation, Drawing Sheet Sizes, Layout of different Drawing sheet sizes, Title Block. Types of lines – Description, Illustration, application. Types of Lettering. Construction of different types of scales, their appropriate uses, principle of R.F, diagonal and vernier. Contraction of geometric drawing, Terms and definition of polygon, circle and ellipse. Drawing of Title block Dimensioning technique - Terminology, feature, Principles, Units of dimensioning, system of dimensioning, method of dimensioning and common feature. Sessional examination to test basic knowledge on Engineering Drawing.	25	75	10	15
UNIT-II	Engineering Drawing – projection views ,	At the end of this Unit the student should be able to: • Understand the projection views of solid part • Draw 2d -orthographic views	Projection of points and lines, projection of plane. Projection of Solid – Projection and orthographic projection. 1st and 3rd angle projection, Principle of orthographic projection. Sessional examination to test basic theoretical knowledge on machine shop theory.	25	75	10	15
UNIT-III	Engineering Drawing – Section views ,	At the end of this Unit the student should be able to: • Understand the section views of solid part and its	Sectional Views – Different types of section, types of sectional views and their uses. Construction of Isometric drawing. Sessional examination to test basic	15	60	10	15

	Isometric Views	need • Draw 2d –orthographic section views • Draw isometric vies	theoretical knowledge on machine shop theory.				
UNIT-IV	Engineering Drawing – Study of Assembly drawing.	At the end of this Unit the student should be able to: • Understand the symbol applied on drawing • Study assembly drawing	Application and meanings of symbols – Welding, Surface texture, etc. Drawing of fasteners, rivets, etc. Graphical representation of Limit, Fit, Tolerances. Blue Print Reading. Study of Assemble drawing Sessional examination to test basic theoretical knowledge on machine shop theory.	15	60	10	15

COURSE NAME: CERTIFICATE COURSE IN MACHINE OPERATION

COURSE CODE:

SUBJECT NAME: WORKSHOP CALCULATION AND SCIENCE

COURSE OUTCOMES: The aim of this course student should be able to:

• Demonstrate basic arithmetic to derive value of unknown quantity / variable.
• Understand & apply engineering material, their classification, properties and applications in the day to day technical application heat
treatment & their advantages.
• Explain & apply speed, velocity, work, power & energy for application in field of work.
• Demonstrate basic algebraic, mensuration, trigonometric facts and formulas to derive value of unknown quantity / variable.
• Explain & apply principles of simple machine & levers for mechanical advantage, efficiency for practical application.
• Demonstrate & apply calculation of area of cut-out regular & irregular surfaces, Volume of geometrical shapes and their cut section
in related shop floor problems.

• Calculate value of unknown sides and angles of geometrical shapes by trigonometrically methods and apply in shop floor problems.
• Understand& apply transmission of power.

THEORY HOURS: 100 PRACTICAL HOURS: THEORY MARKS: 100 PRACTICAL MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Theory hours	Internal Assessment (Marks)	Final Test (Marks)
UNIT-I	Unit system And simple calculations	At the end of this Unit the student should be able to: • Know the different unit • Know to solve Multiplication decimals , root , ratios , percentage calculation , • Velocity and speed	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units Fractions: Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator. Square Root: Square and Square Root, method of finding out square roots, Simple	25	10	15

			problem using calculator. Ratio & Proportion: Simple calculation on related problems. Percentage: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice versa. Mass, Weight and Density: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals. Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems. Sessional examination to test basic theoretical knowledge on Workshop Calculation & Science.			
UNIT-II	Simple calculation on Algebra , mensuration and trigonometry	At the end of this Unit the student should be able to: • Solve simple algebra , mensuration and trigonometry problems	Algebra:- Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables). Mensuration:- Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi-circle, Volume of solids – cube, cuboids, cylinder and Sphere. Surface area of solids – cube, cuboids, cylinder and Sphere. Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables Sessional examination to test basic theoretical knowledge on Workshop Calculation & Science.	25	10	15

UNIT-III	Engineering materials	At the end of this Unit the student should be able to: • Understand the materials: • Type of material • Properties of material • Alloying of materials • Heat treatment of material and its process	Material Science : properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Pig Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys. Heat treatment and advantages. Sessional examination to test basic theoretical knowledge on machine shop theory.	25	10	15
UNIT-IV	Simple Mechanics	At the end of this Unit the student should be able to: • Understand the basic science about work, power, energy • Understand the basic function of livers and mechanics of simple machines • Understand transmission of power by different mechanism	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy. Levers and Simple Machines: levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage. Transmission of power by belt, pulleys & gear drive. Calculation of Transmission of power by belt pulley and gear drive. Sessional examination to test basic theoretical knowledge on machine shop theory.	25	10	15

COURSE NAME: CERTIFICATE COURSE IN MACHINE OPERATION

COURSE CODE:

SUBJECT NAME: EMPLOYABILITY SKILL

COURSE OUTCOMES: The aim of this course student should be able to:

- Read, write and communicate in English language for day to day work.
- Communicate in written and oral and with required clarity ensuring that the information communicated is clear, concise and accurate.
- Understand and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.

- Understand and apply productivity, its benefits and factors affecting the productivity.
- Follow and maintain procedures to achieve a safe working environment in line with occupational health, safety, environment regulations and labour welfare legislation and requirements.
- Understand and apply quality concepts as per ISO and BIS system and its importance.

Recognize different components of 5S and apply the same in the working environment.

THEORY HOURS: **100** PRACTICAL HOURS: THEORY MARKS: **100** PRACTICAL MARKS:

Unit No.	Unit Name	Unit level outcomes	Contents (chapters/topics)	Learning Hours (Pr+Th)	Internal Assessment (Marks)	Final Test (Marks)
UNIT-I	English Literacy and Communication skill	At the end of this Unit the student should be able to: • Read, write and communicate in English language for day to day work	Pronunciation:- Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech) Functional Grammar:- Transformation of sentences, Voice change, Change of tense, Spellings. Reading:- Reading and understanding simple sentences about self, work and environment Writing:- Construction of simple sentences , Writing simple English Speaking / Spoken English:- Speaking with preparation on self, on family, on friends/ classmates, on known, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application	30	20	30

			reference to previous communication. Sessional examination to test basic theoretical knowledge on English Literacy. Introduction to Communication Skills:- Communication and its importance Principles of Effective communication Types of communication – verbal, nonverbal, written, email, talking on phone. Nonverbal communication –characteristics, components-Paralanguage Body – language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort. Listening Skills:- Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening – Attitude, Attention & Adjustment .Active Listening Skills. Motivational Training:- Characteristics Essential to Achieving Success The Power of Positive Attitude Self-awareness Importance of Commitment Ethics and Values, Ways to Motivate Oneself Personal Goal setting and Employability Planning. Facing Interviews:- Manners, Etiquettes, Dress code for an interview, Do's & Don'ts for an interview Behavioral Skills:- Problem SolvingConfidence Building ,			

			Attitude Sessional examination to test basic theoretical knowledge on Communication Skills.			
UNIT-II	IT Literacy	At the end of this Unit the student should be able to: • Understand and apply basic computer working	Basics of Computer:- Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer. Computer Operating System:-Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc., Use of Common applications. Word processing and Worksheet :- Basic operating of Word Processing, Creating, opening and closing, Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets. Computer Networking and INTERNET:- Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search	15	4	6

			Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT – ACT, types of cyber-crimes. Sessional examination to test basic theoretical knowledge on I.T. Literacy.			
UNIT-III	Productivity	At the end of this Unit the student should be able to: • Understand and apply productivity, its benefits and factors affecting the productivity.	Productivity:- Definition, Necessity, Meaning of GDP. Benefits:- Personal / Workman – Incentive, Production linked Bonus, Improvement in living standard. Industry Nation. Affecting Factors:- Skills, Working Aids, Automation, Environment, Motivation How improves or slows down. Comparison with developed countries:- Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages. Personal Finance Management:- Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance. Sessional examination to test basic theoretical knowledge on Productivity.	15	4	6
UNIT-IV	Quality Tools	At the end of this Unit the student should be able to:	Quality Consciousness :- Meaning of quality, Quality Characteristic			

		• Understand and apply quality concepts as per ISO and BIS system and its importance.	Quality Circles :- Definition, Advantage of small group activity, objectives of Quality Circle, Roles and Functions of Quality Circles in organization, Operation of Quality Circle, Approaches to Starting Quality Circles, Steps for Continuation Quality Circles Quality Management System:- Idea of ISO 9000 and BIS systems and its importance in maintaining qualities. House Keeping:- Purpose of Housekeeping, Practice of good Housekeeping. 5S Principles of Housekeeping: SEIRI – Segregation, SEITON –Arrangement, SEISO – Cleaning, SEIKETSU – maintenance of Standards, SHITSUKE – Discipline. Sessional examination to test basic theoretical knowledge on Quality Tools.	15	4	6
UNIT-V	Occupational Safety, Health & Environment	At the end of this Unit the student should be able to: • Follow and maintain procedures to achieve a safe working environment in line with occupational health, safety, environment regulations	Safety & Health:- Introduction to Occupational Safety and Health and its importance at workplace Occupational Hazards:- Occupational health, Occupational hygiene, Occupational Diseases/ Disorders & its prevention Accident & safety:- Accident prevention techniques- control of accidents and safety measures First Aid:- Care of injured & Sick at the workplaces, First-aid & Transportation of sick person Basic Provisions:- Idea of basic provisions of safety, health, welfare under legislation of India Ecosystem:- Introduction to Environment. Relationship between Society Environment,	15	4	6

			Ecosystem and Factors causing imbalance. Pollution:- Pollution and pollutants including liquid, gaseous, solid and hazardous waste. Energy Conservation:- Conservation of Energy, re-use and recycle. Environment:- Right attitude towards environment, maintenance of in-house environment. Sessional examination to test basic theoretical knowledge on Occupational Safety, Health & Environment.			
UNIT-VI	Labour Welfare Legislation	At the end of this Unit the student should be able to: • Understand and know the Labour welfare legislation and requirements.	Labour Welfare Legislation:- Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act. Sessional examination to test basic theoretical knowledge on Labour Welfare Legislation.	10	4	6

EVALUATION PATTERN FOR CERTIFICATE COURSE IN MACHINE OPERATION											
	INTERNAL ASSESSMENT MARKS							**ANNUAL EXAMINATION MARKS**			
	Class Test	**Assignment , Attendance & Behavior**	**Project Work**	**Practical Exercises**	**Oral**	**Project Report**	**Presentation**	**Theory**	**Practice**	**OTAL MARKS**	

Subjects											Passing
Practical Lab		**40**		**80**					**180**	**300**	**Minimum 40% for theory and 60% for Practical.**
Machine Shop Theory	**40**	**20**			**20**			**120**		**200**	
Engineering Metrology	**20**	**10**			**10**			**60**		**100**	
Engineering Drawing	**20**	**10**			**10**			**60**		**100**	
Workshop Calculation & Science	**20**	**10**			**10**			**60**		**100**	
Employability Skill	**10**	**10**					**20**	**60**		**100**	
PROJECT			**60**			**40**				**100**	
Total Marks :										**1000**	