SCHEME OF EXAMINATION

And

SYLLABUS

For

Bachelors in Vocation (B.Voc.)

in

TOOL & DIE Manufacturing

Offered by

Community College of Skill Development

JC Bose University of Science & Technology YMCA
Sector-6, Mathura Road, Faridabad,

Haryana,India

2023-24

ABOUT THE COMMUNITY COLLEGE OF SKILL DEVELOPMENT

The Community College model is a flexible, open education system that is based on lifelong learning needs and is accessible to a large number of individuals in the community. Community College of Skill Development was started in 2013. It primarily focuses on imparting skill-based education on the models of National Occupational Standards (NOS).It provides Entrepreneurship Orientation to the students. Community College of Skill Development has been running B.Voc. in Tool and Die since 2023 with a mission to impart quality education along with extensive hands-on training on the equipment/systems in Tool and Die laboratories and industries. The presence of highly skilled and qualified trainers helps the students to enhance their professional and skill levels.

PROGRAMMEEDUCATIONALOBJECTIVES(PEOs)

PEO-1: To train students with practical skills and experimental practices related to core and applied areas of Tool and Die Engineering to expand their knowledge horizon beyond books and make them industry ready.

PEO-2: To enable students to service, design and maintain automotive equipment which are useful for the industries.

PEO-3: To improve team building, team working and leadership skills of the students with high regard for ethical values and social responsibilities.

PEO-4:Toenablestudentstocommunicateeffectivelyand efficiently.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

To apply practical skills, vocational training and knowledge of Tool and Die fundamentals to industries. The student will be ready and skilled to take-up a career or to pursue higher studies with high regard to ethical values and social responsibilities.

SCHEME OF

EXAMINATION

FIRSTSEMESTER

Subject Code	Subject Name	L-T-P	Credit	Marks Weightage		Course Type
				Internal	External	
TDM-101	Communication Skill	3-0-0	3	25	75	BSC
TDM-102	Engineering Calculations	3-0-0	3	25	75	BSC
TDM-103	Engineering Science	3-0-0	3	25	75	PCC
TDM-104	Tool and Die Technology-1	3-0-0	3	25	75	PCC
TDM-105	Tool and Die Workshop-1	0-0-8	8	30	70	PCC
Total		**12-0-08**	**20**	**130**	**370**	

SECOND SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
TDM-201	Behavioral Skills	3-0-0	3	25	75	BSC
TDM-202	Typography and Computer Application	3-0-0	3	25	75	BSC
TDM-203	Applied Science	3-0-0	3	25	75	PCC
TDM-204	Tool and Die technology-II	3-0-0	3	25	75	PCC
TDM-205	Tool and Die Workshop-II	0-0-8	5	30	70	PCC
Total		**12-0-08**	**20**	**130**	**370**	

THIRD SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
TDM-301	Fundamentals of CNC machines	3-0-0	3	25	75	PCC
TDM-302	Material Science & Heat Treatment	3-0-0	3	25	75	PCC
TDM-303	Basics of Jigs & Fixtures	3-0-0	3	25	75	PCC
TDM-304	Basics of Tools, Dies & Moulds	3-0-0	3	25	75	PCC
TDM-305	Tool and DieWorkshop-III	0-0-8	8	30	70	PCC
Total		**12-0-08**	**20**	**130**	**370**	

FOURTH SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
PCC-TDM-401	Quality Control Techniques	3-0-0	3	25	75	BSC
PCC-TDM-402	Industrial Management	3-0-0	3	25	75	BSC
PCC-TDM-403	Entrepreneurship	3-0-0	3	25	75	PCC
PCC-TDM-404	ToolWorkshop-4	0-0-5	5	30	70	PCC
PCC-TDM-405	Choose any two elective Reliability, Maintenance&Safety Elective -01	3-0-0	3	25	75	PCC
PCC-TDM-406	Plant Layout&ProductHandling Elective-02	3-0-0	3	25	75	PCC
PCC-TDM-407	Adv. Tool and Die Elective-03	3-0-0	3	25	75	PCC
Total		**15-0-05**	**20**	**155**	**445**	

FIFTH SEMESTER

Subject Code	Subject Name	L-T-P	Credit	Marks Weightage		Course Type
				Internal	External	
PCC-TDM-501	On Job Training(OJT)/ Internship					
Total		**0-0-0**	**20**	**350**	**150**	OJT

SIXTH SEMESTER

Subject Code	Subject Name	L-T-P	Credit	Marks Weightage		Course Type
				Internal	External	
PCC-TDM-601	On Job Training(OJT)/ Internship					
Total		**0-0-0**	**20**	**350**	**150**	OJT

FIRST SEMESTER

TDM-101 COMMUNICATION SKILL

B.Voc.(Tool & Die Manufacturing) I Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Pre-Requisite: Spoken English skills

Successive: Basics Communication Skills

Course Objectives: The objective of studying this course is to acquire knowledge on the Basic English grammar starting from speeches to synaptic category going forward withtenses and its types. To comprehend voices, narration and sentence making.

Course Outcomes: Attheend of the course, the student shall be able to:

CO1 To learn about part of Speech.

CO2To learn about Syntactic Category.

CO3 To know more about the Tenses.

CO4 To acquire knowledge on voices and sentence making.

Course Contents:

Unit 1: Introduction to Communication: Meaning, Importance and Function of Communication, Types of communication, language of communication; advantages and disadvantages; Barriers to Communication; Organizational Communication

Unit 2: Grammar: Parts of speech, Articles, Tenses, Formation of Sentences, Active and Passive Voice, Direct and Indirect speech.

Unit 3: Writing and Comprehension: Comprehension, Composition, Translation, Paraphrasing, Letter writing

Unit 4: 7 Cs of Communication; Grice's Cooperative Principle; Group Discussions; Public Speaking; Facing Interviews

Course Outcome:

1. To learn about communication process and ways to make communication effective by Giving attention to all elements involved.
2. To improve grammar and gain confidence by enhancing their abilities to articulate their Ideas.
3. To acquire better writing skills in formal communication.
4. To be able to revise documents for fruitful reading and comprehension.

Reference books:

1. Wren and Martin. *High School English Grammar and Composition.* New Delhi: RRP, 2007
2. Murphy, Raymond. *Essential English Grammar*. New Delhi: Cambridge, 2017
1. EnglishGrammar.NewDelhi:Cambridge,2017.

TDM-102 ENGINEERING CALCULATIONS

B.Voc.(Tool & Die Manufacturing) I Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Pre-Requisite: Basic mathematics

Successive: Concepts of trigonometry, differentiation and integration.

Course Objectives: The objective of studying this course is to Familiarize the prospective graduates with the basics of mathematics, provide knowledge on the application of trigonometry, integration and differentiation and to understand the use of matrices, trigonometry, integration and differentiation to solve formulated mathematical problems.

Course Outcomes: At the end of the course, the student shall be able to:

CO1 Use trigonometry functions, ratios and their application in real world scenarios.

CO2 Use trigonometric identities to solve mathematical problems.

CO3 Understand and use matrices to solve Mathematical problems.

CO4 Deal with differential and integral problems

Course Contents:

Unit-I: Basic Aptitude- Fundamental Arithmetical Operation- Addition, Subtraction, Multiplication and Division. Applied Workshop Problems Involving Addition, Subtraction, Multiplication and Division, System Of Units – Definition, Different Types & System Of Units i.e.(C.G.S. & SI Units for Length, Mass, Area, Volume, Capacity, Time) HCF, LCM, Square Root Cube Root.

Unit-II: Trigonometry – Introduction, Trigonometric Identities, Quadrant Rule, Trigonometric Ratios of Some Specific Angles, Ratios of Complementary Angles, Introduction

Unit-III: Differentiation- Introduction to Derivatives, Product Rule, Quotient Rule, Chain Rule, Derivatives of Algebraic Function, Derivative of Trigonometric Functions.

Unit –IV: Integration: concepts of integration, integration of trigonometric, exponential and Logarithmic functions, integration by parts.

Unit-V: Algebra- Algebraic Expressions and Identities, Terms Coefficients and Factors, Monomials Binomials and Polynomials, Multiplication and Division of Algebraic Expressions, Standard Identities and Their Applications

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Course Outcomes:

1.To Apply the Arithmetical Operations and Conversion of Units.
2. To Convert in Fraction and Decimals, Percentage.
3. To Solve HCF, LCM, Square Roots and Cube Roots.
4. To Deal with Differential Problems.
5. To Learn About Trigonometric Ratios.

Reference Books:

1. Mathematics Book by R.D Sharma
2. Advanced Engineering Mathematics: By Jain Rk.
3. A Basic Course in Mathematics: By Nabjyoti Dutta.
4. Skills in Mathematics: By Amit M Aggarwal.

TDM-103 ENGINEERING SCIENCE
B.Voc.(Tool & Die Manufacturing) I Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course Objectives: The main objective of studying this course is to understand the different system of units and their measurement. In this course students will know the different types of laws of motion, basics of thermodynamics, fuels and their classification and pollutants and its types.

Course Outcomes: Attheend of the course, the student shall be able to:

CO1 To learn about units and dimensions.

CO2Toimproveunderstandingaboutmotionanditslaws.

CO3 To acquire knowledge about thermodynamics.

CO4Tobeabletounderstandpollutionanditscontrol.

Course Contents:

Unit 1: Units and Measurements

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Unit 2: Laws of Motion

Intuitive concept of force, Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion.

Unit 3: Thermodynamics

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; Cp, Cv-calorimetry;changeofstate-latent heat capacity. Thermal equilibrium and definition of temperature (zeroth law of thermodynamics), heat, work and internal energy.First law of thermodynamics, isothermal and adiabatic processes. Second law of thermodynamics: reversible and irreversible processes, Heat engine and refrigerator.

Unit 4: Fuel and their Classification

Definition, characteristics, classification into solid, liquid and gaseous fuel, Petroleum and brief idea of refining into various factions and their characteristics and uses, Calorific value

of fuel, Gaseous fuels- preparation, properties, composition and use of producer gas, water and oil gas.

Unit 5: Pollution & its Control

Air Pollution: Types of pollutants, source effects, sink and control of primary pollutants – CO, Nox, HC, Sox and particulates, effects of pollutants on man and environment – photochemical smog and acid rain. Water Pollution: Classification of pollutants, their sources, waste water treatment – domestic and industrial. Soil Pollution: Composition of soil, classification and effects of soil pollutants and their control. Hazardous Wastes: Classification – radioactive, biomedical and chemical, treatment and disposal – physical, chemical and biological processes.

Reference Books:

1. Thermodynamics by P K Nag
2. Environmental pollution and control engineering: C. S. Rao
3. Hand book of industrial metrology–John W.Greve, Frank W.Wilson, PHI–New Delhi.
4. Engineering Metrology – K.J. Hume, Macdonald and Co.(publisher) London

TDM-104 TOOL & DIE TECHNOLOGY-1
B.Voc.(Tool & Die Manufacturing) I Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course objectives:
1. To study the various manufacturing processes.
2. To understand the working of various cutting tools.
3. To understand measurement and measuring instruments.
4. To introduce about NC and CNC machines.

Unit-1 Introduction to Manufacturing and Metal cutting

Introduction to Manufacturing; Definition of manufacturing process, its classification types, Primary and secondary manufacturing processes, types of production. Machine Tools; Definition, its Functions and classification, introduction to machining operations and common features of metal Cutting.
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.

Unit-2 Measuring Instrument

Calipers – Types – Inside caliper, outside caliper, divider, Odd leg caliper. Vernier Caliper- Parts, uses, checking error, least count, working principle. Outside micrometer - Introduction, parts, Principle, Least count, checking zero error, Sine Bar, Combination Set, Dial Indicator, slip gauges

Unit- 3 Cutting Tools and Cutting Materials

Cutting Tools - Various types of single point cutting tools and their uses, Single point cutting tool Geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed And depth of cut and their effect.
Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, satellite, ceramics and diamond

Unit- 4 Lathe

Principle of turning, Description and function of various parts of a lathe. Classification and Specification of various types of lathe, Drives and transmission, Work holding devices. Lathe tools: Parameters/Nomenclature and applications. Lathe operations - Plain and step turning, facing, parting Off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, Spinning.

Unit-5 Drilling

Principle of drilling.Classification of drilling machines and their description. Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking,

Hole milling, tapping. Speeds and feeds during drilling, impact of these parameters on drilling, machining time. Types of drills and their features, nomenclature of a drill. Drill holding devices. Types of reamers.

Text Books:

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

TDM-105 TOOL & DIE WORKSHOP-1
B.Voc.(Tool & Die Manufacturing) I Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course objective:
1. To understand the safety measures of mechanical workshop.
2. To learn the functions of various conventional machines and unconventional machines.
3. To prepare different jobs by different machining operation.
4. To learn about CNC machine.

Course contents:

1. To Conduct all pre- machining operations:
a) Measure and mark reference points/ cutting lines on the work pieces, using compasses,
Calipers, rulers and other measuring tools) understand the does and don'ts of the manufacturing process as defined in SOPs/ Work
Instructions
c) Set of machine stops or guides as per the specified lengths indicated through scales or work Instructions
d) Set-up, adjust machine tools, fixtures/ jigs and cutting tools in order to perform machining Operations
e) Check the centering and facing of the work pieces and check for alignment of the work Pieces as per the final product output specifications
f) Gain knowledge on gear changing techniques and minor maintenance as per checklist
g) Check the working of different holding fixtures, gears, stops.
h) Brush or spray lubricating material on work pieces where applicable
i) Operate hand wheels or valves in order to feed the component and allow cooling and Lubricating to the tool.

2. To understand various safety measures, working principle & specifications of various Conventional machines (lathe, milling, shaper, grinder etc).

3. To study elements of single point cutting tools and multiple point cutting tools.

4. To prepare single point brazed tool with carbide tip on a mild steel shank involving milling and Brazing operation.

5. To prepare a job involving centering, facing, plain turning and step turning.

SECOND SEMESTER

SECOND SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
TDM-201	Behavioral Skills	3-0-0	3	25	75	BSC
TDM-202	Typography and Computer Application	3-0-0	3	25	75	BSC
TDM-203	Applied Science	3-0-0	3	25	75	PCC
TDM-204	Tool and Die technology-II	3-0-0	3	25	75	PCC
TDM-205	Tool and Die Workshop-II	0-0-8	5	30	70	PCC
Total		**12-0-08**	**20**	**130**	**370**	

TDM-201BS: BEHAVIORAL SKILLS
B.Voc.(Tool and Die Manufacturing) II Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Pre-Requisite: Communication Skills.

Successive: Basic reading and writing skills.

Course Objectives: The objective of studying this course is to discuss Communication skillsandtheirformsandhowitisgoingtohelpthestudents.Toacquirethepracticalknowledgeof writing skills, along with group discussion and interview skills.

Course Outcomes: At the end of the course, the student shall be able to:

CO1 Understand the basic concept of communication.

CO2 To acquire better writing skills informal communication.

CO3 Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.

CO4 Fundamental knowledge about Speaking and reading skills.

Course Contents:

Unit 1: Communication Skills

Meaning of Communication, Importance, Function, Types, Communication barriers and its solutions.

Unit2: Writing Skills

Letterwriting: Formalletter, applicationletter,coveringletterandbusinessletter.Report writing: Academic report, Business report, technical report, News report. Mail writing and resume.

Unit 3: Soft Skills

Definition and significance of soft skills, Group Discussions, basic knowledge of translator and Paraphrasing.

Unit 4: Speaking and Reading Skills

Importance of Literacy skills(Reading,Writing,Listening,Speaking),telephoniccommunication skill, Levels of reading skills, process of skimming and scanning.

Text Books/Reference Books:

1. Mishra.B,Sharma.S(2011)Communication Skills for Engineers and Scientists. PHIL earning Pvt. Ltd.
2. Chaturvedi P.D, Chaturvedi M.(2011)Business Communication:Concepts,Casesand Applications. Pearson Education India.

TDM-202 :Typography and Computer Application
B.Voc.(Tool and Die Manufacturing) II Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Pre-Requisite: Nil

Successive:MS Office,MS Word,MS Excel,and MS Power Point.

Course Objectives

The objective of studying this course is to understand and learn about the basics of Windows, to understand important MS Office programs, and to be able to create documents for printing and sharing.

Course Outcomes

At the end of the course, the student shall be able to:

- **CO1:** Claim proficiency in MS Word and PowerPoint.
- **CO2:** Independently create professional-looking documents and presentations.
- **CO3:** Become familiar with some advanced Word and PowerPoint functions.
- **CO4:** Understand how to use Word and PowerPoint in a variety of professional, educational, and personal situations.

Course Contents
Unit 1: MS Windows

Basic components of Windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders.
Control Panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, using Windows accessories.

Unit 2: Documentation Using MS Word

Introduction to word processing interface, toolbars, menus, creating & editing documents, formatting documents, finding and replacing text, format painter, header and footer, drop cap, auto-text, auto-correct, spelling and grammar tool, document dictionary, page formatting, bookmark, previewing and printing documents.
Advanced features of MS Word – Mail Merge, Macros, Tables, File Management, Printing, Styles, Linking and Embedding Objects, Templates.

Unit 3: Electronic Spreadsheet Using MS Excel

Introduction to MS Excel, cell, cell address, creating & editing worksheet, formatting and essential operations, moving and copying data in Excel, header and footer, formulas and functions, charts, cell referencing, page setup, macros.
Advanced features of MS Excel – Pivot Table & Pivot Chart, Linking and Consolidation, Database Management using Excel – Sorting, Filtering, Validation, What-If Analysis with Goal Seek, Conditional Formatting, Collaborating with Other Users, Analyzing and Presenting Complex Data.

Unit 4: Presentation Using MS PowerPoint

Presentations, creating, manipulating & enhancing slides, organizational charts, Excel charts, Word Art, layering art objects, animations and sounds, inserting animated pictures or accessing through object, inserting recorded or in-built sound effects.
Introduction to MS Access: Creating databases, creating and manipulating tables, forms, queries, reports, modules, importing and exporting data.

Text Books / Reference Books

1. **V. Rajaraman**, *Computer Fundamentals*
2. **Ashok Arora**, *Fundamentals of Computer Systems*
3. **Russell A. Stultz**, *Fundamentals of Computer Systems*

TDM-203 : APPLIED SCIENCE
B.Voc.(Tool and Die Manufacturing) II Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course Objectives

Following are the objectives of this course:

- To learn concepts of units, laws of vectors, parallel forces, moment of force, and couple.
- To learn the fundamentals of properties and behavior of materials.
- To understand different types of communication systems.
- To know the fundamentals of advanced communication systems.

Course Outcomes

After completing this course, the student will be able to:

CO1: Identify the force systems for given conditions by applying the basics of mechanics.
CO2: Create knowledge of properties of matter applicable to engineering.
CO3: Analyze the different concepts of waves and vibration in the field of engineering.
CO4: Analyze the recent trends in physics related to engineering.

Course Contents

Unit – I: Basics of Mechanics and Force System

Significance and relevance of Mechanics – Statics and Dynamics. Space, time, mass, particles, flexible body and rigid body. Scalar and vector quantity, units of measurement (SI units) – fundamental units and derived units.
Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, principle of transmissibility of force.
Force system and its classification. Resolution of a force – orthogonal components of a force, moment of a force, Varignon's Theorem.
Composition of forces – resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel coplanar force systems – law of triangle, parallelogram and polygon of forces.

Unit – II: Properties of Solids and Liquids

Properties of Solids:
Definitions of deforming force, elasticity and plasticity; examples for elasticity and plasticity.
Definition of stress and its types with examples and S.I. unit.
Definition of strain and its types with examples, elastic limit, Hooke's law, stress-strain graph with explanation.
Modulus of elasticity and its types, derivation of an expression for Young's modulus of a material.
Definition of compressibility and factor of safety.
Simple problems on stress, strain and Young's modulus.

Properties of Liquids:
Definition of thrust and pressure with S.I. units.
Definition of surface tension and its S.I. unit.
Definition of viscosity.

Unit – III: Transmission of Heat

Definitions of conduction, convection and radiation with examples.
Definition of thermal conductivity, coefficient of thermal conductivity (K) and its S.I. unit.
Applications of conduction, convection and radiation.

Unit – IV: Thermodynamics

Introduction of thermodynamics, system, surrounding and boundary.
Types of systems, properties of system, state, equilibrium and process.
Types of thermodynamic processes.
Laws of thermodynamics – Zeroth, First, Second and Third Law.

Unit – V: Electromagnetic Waves and Modern Physics

Electromagnetic Waves:
Definition, generation of electromagnetic waves and their properties.

Electromagnetic Spectrum:
Definition, classification and its applications.

Lasers:
Principle, types of lasers, properties and applications.

Nano-Technology:
Definition, advantages and disadvantages of nano-technology.

Reference Books

1. D.S. Bedi, *Engineering Mechanics*, Khanna Publications, New Delhi (2008).
2. Khurmi, R.S., *Applied Mechanics*, S. Chand & Co., New Delhi.
3. Bansal, R.K., *A Textbook of Engineering Mechanics*, Laxmi Publications.
4. Ramamrutham, *Engineering Mechanics*, S. Chand & Co., New Delhi.

TDM-204 TOOL & DIE TECHNOLOGY-II

B.Voc.(Tool and Die Manufacuring) IInd Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course objectives:

1. To study the various manufacturing processes.
2. To understand the working of various cutting tools.
3. To understand measurement and measuring instruments.
4. To introduce about NC and CNC machines.

Unit 1 Introduction to welding processes

Welding Processes: Electric arc welding: working principle, use of AC and DC current in welding, TIG welding, MIG welding, SMAW, SAW, AHW. Introduction to gas welding.

Unit 2 Grinding Machine

Introduction- Abrasive tools, grinding wheels– materials, specifications,
Selection of grinding wheels, Truing and dressing of grinding wheels, abrasives-natural and Artificial, speed, feed and depth of cut, use of coolants.
Types of grinding machines; cylindrical grinders, surface grinders, centre less grinders.

Unit 3 Reaming and Boring Machine

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

Unit-4: Milling machines

Milling machines; Introduction, working principle, principal parts, Size and specification, up milling and down milling,
Milling machine types: Column and Knee type-hand, plain or horizontal, vertical, universal, Universal milling machine, Planer type milling machine or plan mill.
Milling cutters: 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.
Milling operations; Plain or Slab, Face, Angle, Form, Straddle and Gang, Slot and Groove, Keyway, Side, End, Profile, Gear milling operations.

Text Books:

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

TDM-205 TOOL & DIE WORKSHOP-II

B.Voc.(Tool and Die Manufacturing) II Semester

No. of Credits:			8	Sessional:	30Marks
L	T	P	Total	Practical:	70Marks
0	0	8	8	Total:	100 Marks
				Duration of Exam:	3 Hours

Course Contents

A) To Conduct All Pre-Machining Operations

1. Measure and mark reference points/cutting lines on the work pieces using compasses, callipers, rulers, and other measuring tools.
2. Understand the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions.
3. Set machine stops or guides as per the specified lengths indicated through scales or work instructions.
4. Set up, adjust machine tools, fixtures/jigs, and cutting tools in order to perform machining operations.
5. Check the centering and facing of the work pieces and check for alignment of the workpieces as per the final product output specifications.
6. Gain knowledge on gear-changing techniques and minor maintenance as per checklist.
7. Check the working of different holding fixtures, gears, and stops.
8. Brush or spray lubricating material on work pieces where applicable.
9. Operate hand wheels or valves in order to feed the component and allow cooling and lubrication to the tool.

B) To Conduct All Machining Operations

1. Perform exercises on centre lathe such as facing, plain turning, step turning, chamfering, and thread cutting operations.
2. Perform reaming, parting off, and knurling operations using a lathe.
3. Perform drilling and boring operations using a lathe machine.
4. Perform shaping operation on a given mild steel rod.
5. Prepare a job by machining on a milling machine.
6. Prepare a 'V' block on a rectangular block using a shaping machine.
7. Grind the single-point cutting tool with the given nomenclature and measure angles using a tool maker's microscope.
8. Perform exercises on shaping machine to obtain flat surfaces and keyways.
9. Prepare a job by using planer, shaper, and slotting machine.
10. Perform operations such as drilling, counterboring, and tapping using a drilling machine.
11. Make a slot on the given workpiece.
12. Prepare a job by surface grinding on a surface grinder and perform dressing and balancing of wheels.
13. Study and use the broaching machine in different applications.
14. Study a progressive tool and perform blanking and piercing operations.
15. Make rod/pipe bending using a hydraulic press (or perform bending operation).

C) To Conduct All Post-Machining Operations

1. Use files, hand grinders, wire brushes, or power tools for performing debarring operations.
2. Use chisels, scrapers, and other hand tools and equipment to trim, scrape, or debar objects or parts.
3. Clean the hydraulic tank/gauge/tools/fixtures as per the cleaning schedule and the process mentioned in the Work Instruction/SOP manual.
4. Perform minor repairs and adjustments to the machine and notify supervisor/maintenance team when major service or repair is required.
5. Measure the specifications of the finished component and verify conformance as per the Control Plan/Work Instruction.
6. Use devices like micrometers, vernier calipers, gauges, rulers, and any other inspection equipment for measuring specifications with valid calibration status.
7. Note down the observations of the basic inspection process and identify pieces which comply with the specified standards.
8. Organize changing of different worn-out machine accessories.
9. Ensure that the blunt tool is timely and safely replaced by a new tool.

THIRD SEMESTER

THIRD SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
TDM-301	Fundamentals of CNC machines	3-0-0	3	25	75	PCC
TDM-302	Material Science & Heat Treatment	3-0-0	3	25	75	PCC
TDM-303	Basics of Jigs & Fixtures	3-0-0	3	25	75	PCC
TDM-304	Basics of Tools, Dies & Moulds	3-0-0	3	25	75	PCC
TDM-305	Tool and DieWorkshop-III	0-0-8	5	30	70	PCC
Total		**12-0-08**	**20**	**130**	**370**	

TDM-301FUNDAMENTAL OF CNC MACHINES

B.Voc.(Tool and Die Manufacturing) IIIrd Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Students are required to supervise and handle specialized machines and equipment like CNC machines. For this purpose, knowledge and skills about NC machines, part programming in NC machines and tooling for CNC machines are required to be imparted for enabling them to Perform above functions. This subject aims at development of knowledge and skills about CNC Machines, tools, equipment and use of high tech machines for increased productivity and quality.

LEARNING OUTCOMES

After undergoing this course, the students will be able to :

- Explain the construction and tooling of CNC machine.
- Prepare simple part programme.
- Operate a CNC lathe.
- Operate a CNC milling machine.

- Diagnose common problems in CNC machines.
- Explain the trends in the field of automation.
- Use Advanced programming structures.

Unit 1

Introduction

Introduction to NC, Basic Components of NC, binary coding, MCU, , input devices, advantages disadvantages of NC machines over conventional machines, CNC & DNC, their types, their advantages, disadvantages and applications, selection of parts to be machined on CNC machines, Problems with conventional NC, Rules for Axis identification, New developments in NC, PLC Control and its purpose.

Unit 2

Construction and Tooling

Design features, special mechanical design features, specification Chart of CNC machines, types of slide ways, balls, rollers, motor- servo/stepper , axis drive and lead screw, recalculating ball screw and nut assembly, swarf removal, safety and guarding devices, Various cutting tools for CNC machines, overview of tool holder, different pallet systems and automatic tool changer system, tool change cycle, management of a tool room.

Unit 3

Part Programming

Part programming and basic procedure of part programming, NC words, Blocks, part programming formats, simple programming for rational components (Point to point, Straight line, curved surface), tool off sets, cutter radius compensation and wear
Compensation. Advanced structures: Advantages of using advanced structures, part programming using
Canned cycles, subroutines and do loops, mirror image

Unit 4

Problems in CNC Machines

Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-line fault finding diagnosis tools in CNC machines, methods of using discussion forums, environmental problems.

Unit 5

Automation

Automation, suitability of production system to automation, types, emerging trends in

Automation, automatic assembly, Overview of FMS, AGV, ASRS, Group technology, CAD/CAM and
CIM, Automated Identification system

RECOMMENDED BOOKS

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.
2. CNC Machine and Automation by JS Narang, Dhanpat Rai &Co, New Delhi.
3. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata McGraw Hill, New Delhi.
4. CNC Machine by Bharaj; Satya Publications, New Delhi.

TDM-302 MATERIALSCIENCE & HEATTREATMENT

B.Voc.(Tool and Die Manufacturing) IIIrd Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Objectives: The course inculcates students the structure and properties of materials and heat Treatment of materials to modify the properties of materials.
Learning Outcomes: The students will be understand To learn about basic principles of different Engineering materials and applications.
(a)
To understand Crystallography
(b)
To learn about the difference materials
(c)
To learn about the miscellaneous materials
(d)
To learn about the heat treatment

Unit-1
Introduction: Overview of different engineering materials and applications. Thermal, Chemical, Electrical, Mechanical properties of various materials. Overview semi- conducting material

Unit-2

Crystallography: Unit Cell, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor. Behavior of material under load and stress-strain. Overview of failure modes, fracture, fatigue and creep.

Unit-3

Metals and Alloys: Classification of iron and steel, Cast Iron: Different types of Cast Iron, and their Usage. Steals: Steels and alloy steel, Classification of plain carbon steels, Properties and usage of Different types of Plain Carbon Steels, Effect of various alloys on properties of steel, Uses of alloy Steels (high speed steel, stainless steel, spring steel, silicon steel) Non Ferrous Materials, their alloys, Properties and uses of White Metals and their alloys.

Unit-4

Miscellaneous Materials: Classification-thermoplastic and thermo set and their uses, Various Trade Names of engg. Plastics, Ceramics-Classification, properties, applications, uses of Asbestos, Glass wool, thermocouple, cork, mica, Composite materials-Introduction & properties, Overview of nano Materials, carbon, tool & die materials, introduction to PTFE, carbon fiber materials.

Unit-5

Heat Treatment: Purpose of heat treatment, various heat treatment processes- hardening, tempering, Annealing, normalizing, Case hardening and surface hardening-carburizing, nitriding, flame Hardening,

Text Book: -

1. Introduction to Engineering Materials by B. K. Agrawal, TMH,2007
2. Engg Materials And Mettalurgy, by R Srinivasan, TMH, 2nd Edition

TDM-303 BASICS OF JIGS AND FIXTURES

B.Voc.(Tool and Die Manufacturing) IIIrd Semester

No. of Credits:			3	Sessional:	25 Marks
L	T	P	Total	Theory:	75 Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Outcomes: The course inculcates the uses of jigs, fixtures and gauges for production of parts in Industry.

Learning Outcomes
(a) To learn about basic principles and applications of Jigs and Fixtures
(b) To understand different types of jigs operation
(c) To learn about the principles of boring, lathe, milling fixture
(d) To learn about Clamping Devices
(e) To learn about the locating method

Unit-1
Introduction-Materials used in Jigs and Fixtures. Mechanical actuation-pneumatic and hydraulic Actuation, clamping force.

Unit-2
JIGS-Drill bushes -different types of jigs-plate latch, channel, box, post, angle plate, angular post, Turnover.

Unit-3

FIXTURES-General principles of boring, lathe, milling and broaching fixtures, Grinding, planning And shaping fixtures, assembly, Inspection and welding fixtures

Unit-4

Clamping Devices: Basic principles, cutting forces, Rigid clamping, wedge clamping, Cam Clamping, quick action clamps, Toggle clamps, simultaneously acting clamps. Guiding Elements: Jig Bushes

Unit-5

Locating Methods- principles of location, locating methods and devices, redundant location.

Text Books:

- P H Joshi, "Jigs and Fixture", Tata McGraw Hill, 2006.
- P.C. Sharma, "A Text Book of Production Technology", S. Chand, 2007

Reference Books:

- Kempster, "Introduction to Jigs & Tool Design", Viva Books Pvt. Ltd,1998

TDM-304 BASICS OF TOOLS, DIES &MOULDS

B.Voc.(Tool and Die Manufacturing) IIIrd Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Outcomes: The course inculcates the fabrication and uses of jigs, fixtures and gauges for production of parts in industry.

Learning Outcomes

(a)
To learn about basic principles of jigs and fixture
(b)
To understand General considerations in design drill jigs
(c)
To learn about the Vice fixtures, milling fixtures , Boring fixtures
(d)
Describe the advantages, role, principles and differences of jigs / fixtures.
(e)
To learn about basic principles of Gauge design

Unit-1

Introduction to locating and clamping devices: difference between jigs and fixture, advantages of jigs
And fixture, materials used in jigs and fixture, locating principle, locating methods and devices, Standard parts, clamping – analysis of clamping forces, tolerance and error analysis. Consideration of Safety factor while designing of Jig Fixture and Gauge.

Unit-2
Jigs: Introduction to drill jigs, Economics of drill jig, General considerations in design drill jigs , Types of drill jigs, Drill bushings, Method of constructions, clearance – handling clearance, swarf and cutting fluid clearances, burr grooves Methods of inserting bushes, Design Drill jigs for given Components, Drill jigs and modern manufacturing.

Unit-3
Introduction to fixtures, Economics of fixtures, Types of fixtures & Application – overview, Vice Fixtures, milling fixtures , Boring fixtures, broaching fixtures , Lathe fixtures, grinding fixtures, Welding fixture , indexing fixture, Design of fixtures for the given components.

Unit-4
PRINCIPLE OF FIXTURE DESIGN: principles of fixture design – element of fixtures – design Consideration of locators and clamps for fixtures, design of turning fixtures, boring fixtures, milling Fixtures, grinding fixtures, surface grinding and, welding fixtures

Unit-5
Gauge design: introduction, Types of gauges, gauges tolerance, selection of materials for gauges. Taylor's principle, ideal gauge. Design of Positional gauges, Indicator, Flush pin and Receiver gauges. Case studies of gauges for selected components

Text Books:

- P H Joshi, "Jigs and Fixture", Tata McGraw Hill, 2006.
- P.C. Sharma, "A Text Book of Production Technology", S. Chand, 2007

Reference Books:

- Kempster, "Introduction to Jigs & Tool Design", Viva Books Pvt. Ltd,1998

TDM-305 TOOL AND DIE WORKSHOP-III

B.Voc.(Tool and Die Manufacturing) IIIrd Semester

No. of Credits: 8				Sessional:	30Marks
L	T	P	Total	Practical:	70Marks
0	0	0	8	Total:	100 Marks
				Duration of Exam:	3 Hours

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 understand setting up of tooling for CNC. One should have knowledge of types of cutting tools & tool material used.
3. To understand 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. Organizing fixtures tools, tooling's, 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 presenters.
3. Loading the tools on Auto tool changer as per the program
4. Load the fixture

FOURTH SEMESTER

FOURTH SEMESTER

Subject Code	Subject Name	L-T-P	Credits	Marks Weightage		Course Type
				Internal	External	
PCC-TDM-401	Quality Control Techniques	3-0-0	3	25	75	BSC
PCC-TDM-402	Industrial Management	3-0-0	3	25	75	BSC
PCC-TDM-403	Entrepreneurship	3-0-0	3	25	75	PCC
PCC-TDM-404	Tool and Die Workshop-4	0-0-5	5	30	70	PCC
PCC-TDM-405	Choose any two elective Reliability, Maintenance&Safety Elective -01	3-0-0	3	25	75	PCC
PCC-TDM-406	PlantLayout&ProductHandling Elective-02	3-0-0	3	25	75	PCC
PCC-TDM-407	Adv. Press Tool and Die Elective-03	3-0-0	3	25	75	PCC
Total		**15-0-05**	**20**	**155**	**445**	

TDM-401 QUALITY CONTROL TECHNIQUES

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course Objectives:

1) To introduce about quality control techniques.
2) To learn QC tools.
3) To understand Trends in Quality Engineering & Management.

Course Contents:

Unit I: For the complete syllabus, results, class timetable and more kindly download iStudy. It's a lightweight, easy to use, no images, no pdfs platform to make student's life easier.

UnitII: Quality Engineering and Management Tools, Techniques & Standards:7 QC tools, 7 New Quality Management Tools, 5S Technique, Kaizen, Poka-Yoke, Quality Circle, Cost of Quality Technique. Introduction to Quality Management Standards-ISO: 9000, ISO:14000, QS:9000(Concept, Scope, Implementation Requirements& Barriers, and Benefits), Introduction to National and International Quality Awards (Malcolm Baldrige National Quality Award-MBNQA, The Deming Prize Rajiv Gandhi National Quality Award).

UnitIII: Basic Philosophy, Approach, And Implementation Requirements & Barriers. Designing for Quality: Introduction to Concurrent Engineering, Quality Function Deployment (QFD) and Failure Mode and Effect Analysis (FMEA)-Concept, Methodology and Application (with case studies).

UnitV: Contemporary Trends in Quality Engineering&Management:Six Sigma-Basic Concept, Principle, Methodology, Implementation, Scope, Advantages and Limitation of all as applicable. Quality in Service Sectors: Characteristics of Service Sectors, Quality Dimensions in Service Sectors, Measuring Quality in Different Service Sectors.

Books and References:

1. Quality Control&ApplicationbyB.L.Hanson&P.M. Ghare,Prentice Hall of India.
2. Quality Management by Kanishka Bedi.
3. StatisticalQualityControl byM. Mahajan, Dhanpat Rai &Co. (P)Ltd.

TDM-402 INDUSTRIAL MANAGEMENT

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

1. Introduction: Growth of industry, The management of men, materials and machines, the art of management, Sources of capital- industrial individual enterprise, private partnership and private Ltd. Co., Joint Stock Co. shares, debentures, financial agencies and their role in

promoting industries. Break even analysis.

2. Privatesectorandpublicsector:Publicsectorenterprise,meritsanddemeritsofpublicsector industryandprivatesectorindustry,Line,staffandfunctionalorganizations,reasonsforthechoice ofvarioustypesoforganization,functionsofdifferentdepartments,viz.stores,purchaseandsales departments relationship between individual departments.

3. Wages & incentives: Definition of wages, real wage and nominal wage, systems of wage payment, incentives, financial and non - financial incentives, Essentials of a good wage plan, essentials of a good incentive scheme. Introduction to elements of cost & indirect expenses, Materialcost,labourcost,fixedandvariableoverheads,componentsofcost,sellingprice,Factory expenses, administrative expenses, selling & distribution expenses, depreciation, obsolescence, interest on capital, Idleness, Repair and maintenance.

4. Labour,industrial &tax laws: Evolution of industrial law, factory act, workmen compensation act,paymentofwagesact,employee'sstateinsuranceact,Industrialdisputeact.Roleoftechnician in industry: Position of technician in various engineering departments, Role of a supervisor in industry, Foremanship, duties and qualities of a good foreman.

5. Material management: Introduction, Scope of Material Management selective control techniques-ABC analysis, Material handling, inventory control, Essential steps in inventory control, quality standards

ReferenceBooks:1. Industrial Management,S.C.Sharma,KhannaPublishingHouse

TDM-403ENTREPRENEURSHIP

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Unit 1 Entrepreneurship and entrepreneur: Need of Employment and Opportunities, Essential CharacteristicsofagoodEntrepreneur,IndustrialPolicy,Classificationofindustries-

Micro,small scale , Medium scale, Large scale, Type of industries- Production, Job based & Service

Unit 2Entrepreneurship Support System and Start-ups: Introduction to start-up's, Role of District Industries Centre in setting up industry, Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC,KVIC,RSMML,Roleofstatefinancecorporation,stateelectricitycorporations,pollution control board, BIS, I.S.O. etc.

Unit 3 Introduction to Tax System, Insurance and Acts: Idea of income tax, sales tax, excise duty and custom duty, Industrial and fire insurance, procedure for industrial insurance, Introduction to Industrial acts, factory act, Workmen's compensation act 1923, Apprentices act 1961, Environmental protection act 1986

Unit 4 Project Report Preparation: Procedure of preparing a project report, Format of project report, Preparation of project report, Introduction to ISO: 9000 Series of Quality System

TDM-404 TOOL AND DIE WORKSHOP-IV

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits: 5 Sessional: 30Marks

L	T	P	Total		
0	0	5	5	Practical:	70Marks
				Total:	100 Marks
				Duration of Exam:	3 Hours

Course Objectives

1. To understand the safety measures of the mechanical workshop.
2. To learn the functions of various conventional machines and unconventional machines.
3. To prepare different jobs by different machining operations.

Course Contents

1. Measure and mark reference points/cutting lines on the work pieces using compasses, callipers, rulers, and other measuring tools.
2. Understand the do's and don'ts of the manufacturing process as defined in SOPs/Work Instructions.
3. Set machine stops or guides as per the specified lengths indicated through scales or work instructions.
4. Set up, adjust machine tools, fixtures/jigs, and cutting tools in order to perform machining operations.
5. Check the centering and facing of the work pieces and verify the alignment of the work pieces as per the final product output specifications.
6. Gain knowledge on gear changing techniques and minor maintenance as per the checklist.
7. Check the working of different holding fixtures, gears, and stops.
8. Brush or spray lubricating material on work pieces where applicable.
9. Operate hand wheels or valves in order to feed the component and allow cooling and lubrication to the tool.
10. Perform exercises on centre lathe such as facing, plain turning, step turning, chamfering, and thread cutting operations.
11. Perform reaming, parting off, and knurling operations by using a lathe.
12. Perform drilling and boring operations by using a lathe machine.
13. Perform shaping operations on a given mild steel rod.
14. Prepare a job by machining on a milling machine.
15. Prepare a 'V' block on a rectangular block using a shaping machine.
16. Grind the single-point cutting tool with the given nomenclature and measure angles using a tool maker's microscope.
17. Perform exercises on a shaping machine to obtain flat surfaces and keyways.
18. Prepare a job by using a planer, shaper, and slotting machine.
19. Perform operations such as drilling, counter boring, and tapping using a drilling machine.
20. Make a slot on the given work piece.
21. Prepare a job by surface grinding on a surface grinder and perform dressing and balancing of wheels.

Reference Books

1. *A Course in Workshop Technology: Manufacturing Processes* by B. S. Raghuwanshi.
2. *Textbook of Workshop Technology* by R. S. Khurmi and J. K. Gupta.
3. *Workshop Technology Vol. I & II* by Hazra & Chaudhary, Asian Book Company, New Delhi.

TDM-405 RELIABILITY, MAINTENANCE&SAFETYENGINEERING (ELECTIVE-01)

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Unit 1: Reliability

Definition, reliability function, mean failure rate, mean time to failure (MTTF), mean time between failures (MTBF), hazard rate curve, bathtub curve, conditional reliability.

Unit 2: Constant Failure Rate Model

Exponential reliability function, failure modes, CFR model, memorylessness, system reliability: series, parallel, mixed & complex configuration; reliability improvement.

Unit 3: Design for Reliability

Reliability specifications and system measurements, system effectiveness, redundancy, classification of redundancy, introduction of failure mode and effect analysis (FMEA).

Unit 4: Maintainability

Analysis of downtime, repair time distribution, stochastic point processes.

Unit 5: Safety Engineering

Fundamentals of industrial safety, safety policy and safety terminology, different types of safety systems and equipment, safety targets, standards, and objectives.

Reference Books

1. **Reliability Engineering** – S.C. Sharma, Khanna Publishing House

TDM-406 PLANTLAYOUT&PRODUCTHANDLING (ELECTIVE-02)

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Course objectives:

1. To learn Objective of Facility Design.
2. To study computerized handling of layout algorithms.
3. To study Product handling.

1. Objective of Facility Design: Types of layout problems, the layout function, organization of layout. Analysis and Design of Material Flow: Systems approach to flow cycle, process charts, flow process charts, Quantitative analysis of material flow; optimal material flow configuration. Space and Area Allocation for Production and Physical Plant Services.

2. Computerized handling of layout talgorithms;Algorithms for computerized Layout Planning, Construction and Development type of computerized Layout Planning Techniques i.e. CRAFT, ALDEP, CORELAP etc.

3. Product handling; Design of system configurations conforming to various kinds of product features and layout characteristics; Design concepts of common handling and transfer equipment; Different types of conveyors, elevators, fork lifters;

4. Design concept of warehouse facilities commensurate with adopted kind of handling and transfer devices; Automated Handling of materials, Automated Transfer lines, AGVS, Use of Robots in Product handling, automated packaging devices.

5. Application of pneumatic and hydraulic system in transportation and handling of products, Design of integrated plant layout for product handling systems

TDM-407 ADV. PRESS TOOL AND DIES (ELECTIVE-03)

B.Voc.(Tool and Die Manufacturing) IVth Semester

No. of Credits:			3	Sessional:	25Marks
L	T	P	Total	Theory:	75Marks
3	0	0	3	Total:	100 Marks
				Duration of Exam:	3 Hours

Outcomes: The course inculcates students presses and dies used to give final shape to the parts bing produced in industry.

Learning Outcomes

(a) To learn about basic principles and applications of presses
(b) To understand the design consideration for blanking and piercing Dies
(c) To understand the design consideration for bending Dies
(d) To understand the designing of shearing tools

Unit-1: Presses, Compound Dies & Inverted Dies: Press Working Terminologies, construction and Types of presses-mechanical & automatic, Computation of press capacity, Introduction to Inverted Dies, construction and function of various parts of Inverted dies, Compound dies, function of various Parts of Compound die, Design of compound and Inverted Dies.

UNIT II: Principles of Blanking and Piercing Dies: Basic Blanking or piercing operation, Shearing Theory, calculation of cutting force and stripping force, importance of cutting force, Calculation of press tonnage, calculation of cutting clearance, importance of cutting clearance. Method of reducing the cutting force.

UNIT III: Introduction to various parts of Blanking and Piercing Dies: Function, types and Construction of Punches, Punch Plate, Die Plate, stripper plate, Top Plate, Shank, Guide pillar, Guide Bushes, gages, Stock guides, Die stops, Nest Gages and Pushers, Stock material utilization and strip Layouts. Types of Die Sets

UNIT IV: Designing of Shearing Tools: Design of blanking, Piercing Dies, Clearance and corner Radii.

UNIT V: Introduction and Design of Bending Dies: Basic of Bending, bending stress, bend Allowance curve, estimating Flat Blank lengths, Introduction to Bending Dies to produce V,L and U Shaped Bend components, Grain direction, Spring back effect, calculation of bending force and pad Force, Design of Bending Dies.

Text Books:

1. Cyril Donaldson and V. C. Goold, “Tool Design”, TMH
2. Ostergaard, “Advance Die Making”, MGH, New York, 1993.
3. P.H. Joshi, “Press Tool Design and Construction”, Wheeler Publishing, Delhi, 2000

Reference Books:-

Vukota Boljanovic,"Sheet Metal Stamping Dies: Die Design and Die-Making Practice", Industrial Press, Inc. New York, NY, USA

FIFTH SEMSTER

FIFTH SEMESTER

Subject Code	Subject Name	L-T-P	Credit	Marks Weightage		Course Type
				Internal	External	
PCC-TDM-501	On JobTraining(OJT)/ Internship					
Total		**0-0-0**	**20**	**350**	**150**	OJT

Students will go into industries for **On Job Training**. Students will be evaluated based **upon On Job Training (OJT)/Internship** including report and presentation.

SIXTH SEMSTER

SIXTH SEMESTER

				Marks Weightage	Course

Subject Code	Subject Name	L-T-P	Credit	Internal	External	Type
PCC-TDM-601	On Job Training(OJT)/ Internship					
Total		**0-0-0**	**20**	**350**	**150**	OJT

Students will go into industries for **On Job Training**. Students will be evaluated based **upon On Job Training(OJT)/Internship** including report and presentation.

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