# DIPLOMA IN PLASTICS MOULD TECHNOLOGY (DPMT) SYLLABUS

## SEMESTER - I

### THEORY

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Total (18 weeks-19½ Hours per week) 267 84 18 240 360 600

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Total (18 weeks-10½ Hours per week) 16 16 200 200 400

### PRACTICAL

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Total (18 weeks-12 Hours per week) 216 16 200 200 400

## SEMESTER – II

### THEORY

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Total (18 weeks-18 Hours per week) 255 69 18 240 360 600

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Total (18 weeks-12 Hours per week) 216 16 200 200 400

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Total (18 weeks-10½ Hours per week) 16 16 200 200 400

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Total (18 weeks-12 Hours per week) 216 16 200 200 400

### CH- Contact Hours TH-Tutorial Hours EH- Examination Hours
## SYLLABUS
### DIPLOMA IN PLASTICS MOULD TECHNOLOGY (DPMT)

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CH- Contact Hours  TH-Tutorial Hours  EH- Examination Hours
## DIPLOMA IN PLASTICS MOULD TECHNOLOGY (DPMT)
### SYLLABUS

#### SEMESTER - V

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| MTL 504 Mould Manufacturing Practice - II | 324 | 8 | 100 | 100 | 200 |
| MTL 505 CNC Lab                          | 40.5 | 4 | 50 | 50 | 100 |
| Library                                  | 27 | - | - | - | - |
| **Total (18 weeks-21½ hours per week)**  | 391.5 | 12 | 150 | 150 | 300 |

#### SEMESTER - VI

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</table>

| MTL 603 CAM & CNC Lab                    | 40.5 | 4 | 50 | 50 | 100 |
| MTL 604 Project Work                     | 391.5 | 8 | 100 | 200 | 300 |
| Library                                  | 27 | - | - | - | - |
| **Total (18 weeks-25½ hours per week)**  | 459 | 12 | 150 | 250 | 400 |

**CH-Contact Hours**  **TH-Tutorial Hours**  **EH- Examination Hours**
DPMT
SEMESTER – I

GE101-COMMUNICATION ENGLISH-I  (54 Hours)

Unit I  (10½ Hours)
Grammar- Parts of Speech; Voice; Direct and Indirect speech; Tenses; Infinites, Gerunds, Prepositions, Question tag, One-word substitute, Articles, Adverb, Punctuation,

Unit II  (10½ Hours)
Letter writing-Personal letters (letter to your friend inviting to birthday party, letter to your father asking him to permit to join Education Tour, letter from a son/daughter to his/her father stating how he/she hopes to fare in the approaching Diploma Examinations, letter to a friend offering suggestions as to what to do after completing the Diploma course)

Unit III  (12 Hours)
Composition (Simple passage related to topics such as Environment, Moral story, Science & Technology, about A Favorite Place, Hobbies, School life etc), Common Errors (Noun, pronoun, articles, adverb, prepositions etc.), Correction of sentences;

Unit IV  (10½ Hours)
Dialogue writing; Note-making; Essay writing (Related to Environment and Science & Technology); Writing Instructions (Imperatives/ ‘Should’ form), Sending communication through E-mail (All Personal letters)

Unit V  (10½ Hours)
Hints Development, Filling forms (Bank challan, application for bank loan Railway ticket booking)

Phrases: At all; Instead of; In spite of, As well as; Set up; Upset; Look up; Call off; Call out; Come across; Set right, Sending communication through E-mail.

Idioms: Work up(excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; back out Carry out; done for (ruined);Bring about; Go through; Ran over; Look up(improve); pick out (selected)

Text /Reference Books


Note: Minimum of one assignment is mandatory from each unit.
DPMT
SEMESTER – I

GE 102 – ENGINEERING MATHEMATICS (54 Hours)

Unit I  Algebra (10½ Hours)

Determinants - Expansion of determinants up to third order - properties of determinants - Solution of simultaneous equations using Cramer's rule.

Matrices - Introduction - Definition - Types of matrices - Operations on matrices.

Binomial Theorem: Introduction to permutation and combination - Definitions - Values of \( np_r \) and \( nc_r \). Binomial theorem for a positive integral index

Unit II Complex Numbers (10½ Hours)

Introduction - Definition, real and imaginary parts, conjugates, modulus and amplitude form, multiplication and division of complex numbers. Argand diagrams - Collinear points, four points forming square, rectangle, rhombus and parallelogram. Simple problems. Demoivre's theorem - related problems.

Unit III Analytical Geometry (10½ Hours)

Pair of straight lines: Pair of lines passing through origin - ax² + 2hxy + by² = 0 expressed in the form \((y-m_1x)(y-m_2x)=0\). General equation of the second degree, \(ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0\), to represent pair of straight lines. Condition for second degree equation to represent pair of lines.

Circles: Equation of circle - Given centre and radius - General equation of circle finding center and radius, equation of circle described on the line joining the points \((x_1,y_1)\) and \((x_2, y_2)\) as diameter with simple problems.

Unit IV Trigonometry (10½ Hours)

Compound angles: Expansion of sin \((A \pm B)\), cos \((A \pm B)\) and tan \((A \pm B)\) problems; solving the above expansions.

Multiple Angles: Trigonometrical ratios of multiple angles (2A and 3A only) and sub-multiple angles - Simple problems.

Unit V Differential Calculus (12 Hours)

Limits: standard results
\[
\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}, \quad \lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1, \quad 1 \to 0
\]

Differentiation: Definition - Differentiation of \(x^n, \sin x, \cos x, \tan x, \cot x, \sec x, \cosec x, \log x, e^x, u \pm v, kv + c, uv, uvw, u/v\). Problems using the above results.

Successive differentiation: Successive differentiation and formation of differential equations up to second order.
Text / Reference Books

1. Mathematics for Polytechnic Colleges (First Semester) - P. Krishnamurthy, N. Thangasamy.

Note: Minimum of one assignment is mandatory from each unit.
DPMT SYLLABUS

GE 103 – ENGINEERING PHYSICS

(54 Hours)

Unit I - UNITS & DYNAMICS

(13½ hours)

Units and Dimensions - Fundamental quantities and derived units, systems of units (SI, CGS, FPS) - Dimensional Formula for area, volume, density, velocity, momentum, acceleration, force, impulse, work & power - Dimensional equation – Derivation of expression of period of simple pendulum using dimensions.

Dynamics - Scalar and vector quantities - Addition and Subtraction of vectors (Triangle method) - Resolution of vectors into two mutually perpendicular vectors

Force and motion - Force - Addition of forces - Triangle law of forces - Lami’s theorem - Momentum and Its Conservation - Speed, velocity and acceleration

Circular Motion - Relation between linear and angular distance, velocity and acceleration - Centripetal and Centrifugal force. Parabolic Motion - Time of flight of a projectile - Kinetic energy - Potential energy - Law of conservation of energy.

UNIT II – ELASTICITY AND SURFACE TENSION

(13½ hours)

Elasticity - Stress–strain - Hooke’s law - Young’s Modulus, Bulk Modulus, Rigidity modulus and Poisson’s ratio – Determination of Young’s modulus - Torsional pendulum

Surface Tension and Viscosity - Surface tension - Surface energy - Angle of contact - Relation between surface tension and surface energy - Determination of surface tension by capillary rise method. Viscosity - Coefficient of viscosity - Streamline and turbulent flow - Reynolds number - Poiseuille’s formula - Stoke’s formula - Terminal velocity.

UNIT III - HEAT

(13½ hours)

Temperature measurement - Centigrade, Fahrenheit and Kelvin scales of temperature measurement – Newton’s law of cooling - Expansion of gases - Verification of Boyle’s law & Charle’s law - Specific heat of gas at constant volume and at constant pressure - Mayor’s relation - Isothermal expansion of gas - Adiabatic expansion of gas - Postulates of Kinetic theory of gases.

Modes of heat transfer and their examples

UNIT IV - LIGHT

(13½ hours)

Optics - Snell’s law of refraction - critical angle - Total internal reflection - Optical fiber - convex and concave mirrors - focus, image formation and concave lens-focal length, simple microscope - magnifying power - velocity of light - relation between velocity, wavelength and frequency of light.

Laser - Introduction - principle - population Inversion - Spontaneous and stimulated emission, optical pumping - characteristics - types of laser (not in detail) - applications.
Text/Reference Books

3. “Physics Part I & II”, Halliday and Resnick

Note: Minimum of one assignment is mandatory from each unit.
GE 104 – FUNDAMENTALS OF COMPUTER ENGINEERING (54 Hours)

Unit 1 (10½ Hours)

**Introduction to Computer** – Generation of computers-classification-Central Processing Unit (CPU), Memory Unit, Input/ Out Devices : Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT) , Printers, Plotters, Bar Code Reader, Secondary Storage Devices-Floppy, Hard Disk, CD, DVD, Flash Drive, Block Diagram Showing Interconnection of Computer Parts

**Operating System** - Definition of Operating System (OS), Types of OS- Single user, Multi user, Multi Programming, Time Sharing, Multi Processing,

Unit 1 (16½ Hours)


Unit 1 (16½ Hours)

**Information Processing**-Word processor- Introduction to MS-Word, Starting MS-Word, Special Features of MS- Word, Using Help, Opening Document, Typing and Editing, Copying, Inserting, Moving, Deleting ,Copying from One Document to Others , Undo, Redo, Spell Check, Find and Replace, Formatting; Characters and Fonts, Spacing, Removing Characters Formatting, Inserting Symbols, Paragraphs. Page Setting, Header and Footer, Page Breaks, Borders and Shading

**Power Point** -Introduction to Power Point, Creating a Presentation/Slide, Adding Animation in Slide, Running a Slide Show

Unit 1 (10½ Hours)


**Text / Reference Books**

2. Rapidex Computer course , Jayant pushtak mandal, Neogy.

**Note:** Minimum of one assignment is mandatory from each unit.
GE 105 – ENGINEERING DRAWING – I  

Unit I  

The Importance of Engineering Graphics: Explanation of the scope and objective of Engineering Drawing – its importance as a graphic communication - need for preparing drawing as per standards – BIS, SP 46.


Free hand Lettering and Numbering: Need for legible lettering and numbering on drawings – selection of suitable size of lettering for different drawing, writing of Engineering drawing titles and notes using both vertical and sloping styles.

Dimensioning: Function of dimensioning - need for dimensioning - engineering drawing according to BIS – Notation used in dimensioning – Dimension line – Extension line – Arrow heads and leader – System of dimensions - Method I and Method II.

Geometric Construction: Construction of regular polygon - given the length of its side, Conics-construction of ellipse, parabola and hyperbola by eccentricity method, construction of cycloid, construction of involutes of square and circle, drawing of tangents and normal to the above curves.

Unit II  

Principles of Orthographic Projection: Explanation of the meaning of orthographic projection using a viewing box and a model- number of views obtained need of only three views for displaying the object - explanation of the meaning of first angle and third angle projection – symbol of projection-Front view, top view and side view-sketching these views for a number of engineering objects.

Unit III  

Projection of Points, Lines and Planes: Projection of points in different quadrants, projection of straight lines parallel to one or both planes, parallel to one plane – perpendicular to other – inclined to one plane and parallel to other line inclined to both planes (in first quadrant). Methods of finding true length and its inclination with the reference planes. Projection of planes and polygonal surface – parallel to one plane and perpendicular to other plane (in first quadrant).

Unit IV  

Projection of Solids: Projection of simple solids like prism, pyramid, cylinder and cone when the axis is parallel to one plane and perpendicular to other plane in first quadrant.
Text / Reference Books


Note: Minimum of one assignment is mandatory from each unit.
DPMT
SEMESTER – I

MT 101 – MACHINE SHOP TECHNOLOGY – I (54 Hours)

Unit I (13½ Hours)


Cutting Fluids: Purpose - Type of cutting fluids – Applications – Selection of a cutting fluid – Effect of coolants on cutting variables ie, Speed, Feed, Depth of cut and tool life for different materials.

Pedestal grinding machine - Types of machine- types & selection of grinding wheels - Sharpening of cutting tools.

Unit II Lathe (21 Hours)


Unit III Shaping, Planning & Slotting Machines (10½ Hours)


Unit IV Drilling Machine (9 Hours)

Type of drilling machines, tool holding devices, work holding devices, types of drills, elements of drills, Drill bit material and specifications ,Sharpening of drills. Speeds and feeds of tool on various metals such as cast iron, mild steel, harden alloy steel, brass and Aluminum.

Counter boring, counter sinking, Reaming-types of reamers, elements of reamers and drill hole size for reaming-safety while working. Bell mouth problem in reaming, over size due to lip out.

Hand taps, machine taps, drill hole size for tapping, tap wrenches, Dies–solid, split and adjustable dies stocks.

Text / Reference Books
2. Production Technology - Dr. R.K. Jain.
DPMT
SEMESTER – I

GEL 106 - ENGINEERING PHYSICS LAB (40½ Hours)

1. Determination of thickness of a metal wire using screw gauge
2. Determination of diameter of a cylindrical bar using vernier calliper
3. Determination of time period of simple pendulum.
4. Experiment to verify Hook’s law
5. Experiment to verify Lami’s law
6. Determination of focal length of convex lens
7. Determination of focal length of concave lens
8. Determination of Young’s modulus using non-uniform bending method
9. Determination of moment of inertia and rigidity modulus using torsional pendulum

Reference Books
DPMT
SEMINSTER – II

GEL 107 – COMPUTER ENGINEERING LAB

1. Study of Computer Components
2. Practice of Computer Booting Process in XP
3. Demonstration of Windows Environment
4. Practice - using My Computer, Windows Explorer
5. Practice - using Control Panel
6. Practice - My Network Places
7. Practice - CD and DVD Writing
8. Practice - Paint
10. Demonstration of Network
11. Creating e-mail Account , Sending and Receiving e-mails.
12. Searching Web Page/ Site using Search Engine :
   (eg. google.com, yahoo.com, altavista.com etc.)

Exercise Based on MS-Word:
   1.1 Document Preparation
   1.2 Printing Document
   1.3 Mail Merge usage
   1.4 Draw Table

Exercise Based on Ms-Excel :
   1.1 Work Book Preparation
   1.2 Printing Workbook
   1.3 Data-base usage
   1.4 Draw Charts

Exercise Based on Power Point :
   1.1 Creating Slide
   1.2 Adding, Animations in Slide
   1.3 Presentation

REFERENCE BOOKS :

2. PC Software for Windows made simple R.K. Taxali, TMH
3. Mastering Windows XP TMH
4. Introduction to Networking NANCE, PHI
5. First Course in Computer Science Sanjeev Saxena, Vikas Publishing House
6. First Look Microsoft Office 2003 Murray, PHI
MTL 101 – WORKSHOP PRACTICE (94½ Hours)

Workshop Safety (6 Hours)
General shop floor safety, safety on fitting bench and safety on machines, handling of materials

1. Familiarization of Workshop Tools (13½ Hours)

Hand tools, Marking tools: Scribers, compass, dividers, outside and inside caliper, hermaphrodite caliper, ordinary scribing block, universal scribing block, angle plate, V-block, centre punch, dot punch, prick punch, try square, beveled try square, surface plate, straight edge, combination set.

Cutting tools: Chisels – flat, crosscut, half round, diamond point.

Files: single cut and double cut files- rough, bastard, medium, smooth, dead smooth files – flat, square, pillar, round, triangular, half round, knife and needle files, rifler files (spoon file).

Hack saw: Types of frame - Solid frame and adjustable frame – blades of different grade.

Striking tools: Ball peen, Straight peen, Cross peen, Steel hammers and Double-faced plastics hammers (soft hammer).

Holding devices: Bench vice, hand vice, swivel base vice

Miscellaneous tools: screwdrivers, Open end spanner, double end spanner, adjustable spanner, box spanner and ring spanner

2. Study and Practice on Measuring Instruments/Equipments (13½ Hours)


Geometrical measurements: Straightness, Flatness, Parallelism, Squareness, Concentricity.

Standard Gauges: Type of gauges, Radius gauges, Feeler gauges, Screw pitch gauge, Taper gauge & Thickness gauges.

3. Filing and Fitting Practice (48 Hours)

Filing Exercise: Balancing of hand file, producing flat surface, making parallel surface, making perpendicular surface, radius filing, and taper filing, maintaining dimension.

Universal fitting: Filing to maintain overall size- Hacksaw cutting, finishing by filing, filing to maintain fit between male and female pieces.

Template making practice: to make profile geometry by cutting and filing.

Cube fitting: Filing to maintain overall size – filing square hole in the middle – filing a cube to suit the square hole with slide fit.
4. Pedestal Grinding (13½ Hours)

Safety precautions - Sharpening of cutting tools - single point, knife tools, Form tools.
DPMT
SEMESTER – II

GE 201- COMMUNICATION ENGLISH-II ( 54 Hours)

Unit I (10½ Hours)
Grammar – Changing of sentence into negative without changing the meaning; Writing definitions; Composition – Conversion of graphics (pie-chart, bar-chart, table, Flow Chart).

Unit II (10½ Hours)
Degrees of comparison; Letter writing – Business and official letters (Letter of quotation, letter of clarification, letter placing orders).

Unit III (10½ Hours)
Sequencing of jumbled sentences; Answering the verbal questions in affirmative and negative; Letter writing- Letter for seeking permission for industrial visit, Letter to the Editor, Inviting a VIP.

Unit IV (10½ Hours)
Synonyms and Antonyms; Spelling and Punctuations; forming meaningful sentences for the words given; Letter writing- Letter of (request for leave, Bonafide certificate, testimonials); Check list.

Unit V (12 Hours)
Writing purpose statements ; Concord; Modal verbs; Letter writing – letter of application for a job with Bio-data/ Curriculum Vitae; Sending the job application through e–mail (along with the attachment); Technical Report writing (Analytical report, Project report, inspection report, production report, investigation report, field report).

Text/Reference Books

4. Wren and Martin,“High school English Grammar and Composition”. S.Chand&co., Ltd.

Note: Minimum of one assignment is mandatory from each unit.
GE 202 - APPLIED MATHEMATICS (54 Hours)

Unit I: Vector Algebra (10½ Hours)


Product of Vectors - Scalar and vector product of two vectors - Angle between two vectors

Applications of vectors - Work done-moment - Scalar and vector triple product

Unit II: Integral Calculus (12 Hours)

Integration - Definition - Integral values using reverse process of differentiation. Integration using decomposition method. Integration by substitution - Integrals of the form
\[ \int [f(x)]^n f'(x) \, dx, \, n \neq 1. \]
\[ \int f'(x)/f(x) \, dx, \int [f(x)] f'(x) \, dx \]

Standard Integrals - Integral of the form \( \int \frac{dx}{a^2 \pm x^2}, \int \frac{dx}{x^2 - a^2}, \int \frac{dx}{\sqrt{a^2 - x^2}} \)

Integration by parts - Integration by parts and Bernoulli's form to evaluate \( \int x \sin nx \, dx, \int x \cos nx \, dx, \int x^2 \, dx, \int x^n \log x \, dx, \int \log x \, dx. \)

Unit III: Applications of Differentiation (10½ Hours)


Unit IV: Applications of Integration (10½ Hours)

Definite integral, Area and volume - Area of circle, Volume of sphere and cone – Simple problems. Solution of differential equations - variable separable

Unit V: Probability & Statistics (10½ Hours)

Definitions - Axioms - addition formula, mutually exclusive event, addition Theorem on Probability, conditional probability - Multiplication theorem.


Discrete Distributions - Binomial Distributions - Expression for mean, variance and standard deviation - simple problems.

Text / Reference Books
1. Applied Mathematics for Polytechnic Colleges (Second Semester) - P.Krishnamurthy, N.Thangasamy.
2. Higher Secondary - First Year - Tamil Nadu Text Book Cooperation.

Note: Minimum of one assignment is mandatory from each unit.
GE 203 - FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING (41 Hours)

Unit I: DC & AC Circuits: (8 Hours)

Fundamentals of AC voltage and current – Peak, average, RMS value of sine wave, Frequency, time period, amplitude, power, power factor, Single Phase/ 3 phase connection, Delta Connections - relationship between phase and line voltages, current in star and Delta connections.

Unit II: DC Generator, DC Motor: (8 Hours)
DC Generator & DC Motor - Construction – Principles of operation, types and applications, Emf equation of Dc machine, Necessity for starter, three points, four point starters.

UNIT III: AC machines: (8 Hours)
Transformer– Types of transformers (Current & Voltage) - principle of operation and construction EMF equation – losses in a transformer – efficiency.

Principle of operation of single phase capacitor start induction motor – applications – three phase induction motors – squirrel cage and slip ring IM (construction and working principle)

Unit IV : Special motor and electrical safety: (8 Hours)

Unit V : Basic Electronics and Logic Gates: (9 Hours)
Semiconductor materials – N type and P type – PN Junction – forward and reverse bias, characteristics of PN junction diode – Half wave rectifier, full wave rectifier, bridge rectifier,. Transistor – construction of NPN and PNP types.

Logic Gates – positive and negative logic, definition, symbol, truth table, Boolean expression for OR, AND, NOT, NOR, NAND, EXOR and EXNOR gates & its basic application.
Text / Reference Books

4. B.L. Theraja, Fundamentals of Electrical and Electronics Engineering, S.Chand & Co.

Note: Minimum of one assignment is mandatory from each unit.
DPMT SYLLABUS

GE 204 – ENGINEERING DRAWING – II

(67½ Hours)

Unit I

Sectional views of objects
Need for sectional drawing of an engineering object- Sectioning of solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other, obtaining true shape of section.

Auxiliary views
Need of auxiliary views – auxiliary views given engineering drawings

Development of surfaces
Development of lateral surfaces of simple and truncated solids- prisms, pyramids, cylinders and cones- development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

Unit II

Pictorial drawings
Principles of isometric projection, construction of isometric scales- Isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones -isometric projection of simple Engineering.

Perspective drawing
Principle of perspective projection – Type of perspective projection – Perspective projection of prisms, pyramids and cylinders by visual ray method.

Unit III

Fastening Devices
Basic Fastening Devices - Temporary and permanent fastenings - areas of applications - Bolts and nuts - different types of bolted joints for different applications - purpose of locking nuts - types of lock nuts. Exercises in drawing bolted connection using standard proportion. Exercises in the selection of appropriate fastening devices to meet the given working conditions.

Unit IV

Assembly and Detail Drawings of Machine Part

Exercises in assembly and detailed drawings of sleeve & cotter joint, socket & spigot joint, knuckle joint, muff coupling, half lap muff coupling, protected flanged coupling, Plummer block, Tail stock and Screw jack
Text / Reference Books

2. Engineering Drawing by N. D Bhutt.

Note: Minimum of one assignment is mandatory from each unit.
GE 205 – ENGINEERING CHEMISTRY (54 Hours)

Unit I – STRUCTURE AND BONDING (13½ hours)


Chemical Bonding: Theory of valency- ionic bonding, covalent bonding- (with examples for formation of simple compounds. Coordinate covalent bonding & hydrogen bonding.

Acids & Bases: Concept of acids & bases - pH & pOH concept - pH scale-Buffer solutions.


Unit II – ORGANIC CHEMISTRY AND FUELS (13½ hours)


Fuels: Definition - types of fuels - advantages of gaseous fuels - calorific value - crude oil - distillation - extraction of petroleum products using fractional distillation method- knocking & its prevention - octane number.

Unit III – ELECTROCHEMISTRY (13½ hours)


Unit IV - ENGINEERING MATERIALS (13½ hours)

Engineering Materials: Definition, classification, properties and uses of the following engineering materials - abrasives, ceramics, ferrous and nonferrous metals, adhesives

Plastic Materials: Thermoplastics – Thermoset and Thermo plastics & their differences

Rubber Materials: Natural rubber - Preparation from latex - Disadvantages of natural rubber, Synthetic rubber – Preparation. Need for vulcanization.
Text / References Books


Note: Minimum of one assignment is mandatory from each unit.
Unit I Crystallography

Crystalline solids – Amorphous solids – Space lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – ‘d’ spacing in cubic lattice – Calculation of atoms per unit cell – Atomic radius – Coordination number and Packing factor for SC, BCC, FCC and HCP structures

Unit II Ferrous and Non-Ferrous Metals

Ferrous Metals:
Classification of iron and steel - Manufacture of pig iron, wrought iron, cast iron and steel - Effect of various alloying elements on steel.

Non Ferrous Metals:
Properties and uses of nonferrous metals. Important ores and properties of aluminium, copper, zinc, tin, lead – Non ferrous alloys – Brass, Bronze, Gun metal and Beryllium Copper – properties and applications.

Unit III Heat Treatment

Advanced Heat treatment techniques - Vacuum hardening, Plasma Nitriding.

Unit IV Mechanical Properties and Testing

Mechanical properties of metals-Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), Impact test - Izod and Charpy, Fatigue and creep tests, fracture toughness tests. Hardenability, Jominy end quench test, Non Destructive Techniques.

Text / Reference Books

7. Material science by R.S.Sedha, R.S.Khurmi, S.Chand publishers

Note: Minimum of one assignment is mandatory from each unit.
DPMT
SEMESTER – II

GEL 206 – ELECTRICAL AND ELECTRONICS ENGINEERING LAB  (27 Hours)

1. Electrical Engineering Lab  (13½ Hours)
   1. Study of measuring instruments – Ammeter – Volt meter – Watt meter etc.
   2. Determination of unknown resistance by Ohm’s Law.
   3. Energy measurement in a single phase circuit using lamp load.
   4. Power measurement in a single phase circuit.
   5. Load test on a single phase transformer.
   7. Verification of series and parallel circuit.
   8. Study of DC & AC machine starters.

2. Electronics Engineering Lab  (13½ Hours)
   1. Characteristics of PN junction diode.
   2. Characteristics of transistor.
   3. Construction of bridge rectifier.
   4. Verification of Logic gates.
   5. Characteristics of Photo Diode, LED and thermistor & zenerdiode.
   7. Study of microprocessor, microcontroller & drives.

Text / Reference Books

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Publications
2. Electronic Devices and Circuits, Sanjeev Gupta, Dhanpat Rai Publications.
DPMT
SEMESTER – I

GEL 207 – ENGINEERING CHEMISTRY LAB

1. Volumetric Analysis
   
   **Acidimetry – Alkalimetry**
   
   (a) Estimation of Hydrochloric acid
   (b) Estimation of Sulphuric acid
   (c) Estimation of Sodium hydroxide given standard sodium carbonate solution & Hydrochloric acid as a link solution

2. Permanganometry
   
   (a) Estimation of potassium permanganate
   (b) Estimation of strength of Oxalic acid

3. EDTA Titration
   
   (a) Estimation of total hardness of water for the water sample

4. pH Determination
   
   (a) Determination of pH using pH meter

5. Preparation of Standard Solutions
   
   (a) Preparation of 1N, 0.5N & 0.1N solution of sodium carbonates
   (b) Preparation of 1N solution of oxalic acid

**Text / Reference Books**

1. Practical Chemistry for Class 11th and 12th, S. Chand Publishers.
2. ISC Practical Chemistry for Class 11th and 12th by S.P. Sharma, S.Chand Publishers.
DPMT SYLLABUS

MTL 202 – MACHINE SHOP PRACTICE – I (122 Hours)

1. Pedestal Grinding (13½ Hours)
Safety precautions - Sharpening of cutting tools- parting and grooving tools, thread cutting tools.

2. Shaper (27 Hours)
Safety precautions - Familiarization with shaping machine- principal parts, work holding device, Cutting tools & tool holding device - familiarize with the operations.

Shaping of a rectangular block - Shaping a ‘V’ groove in a rectangular block - Dove tail machining and square groove machining.

3. Drilling Machine (14 Hours)
Safety precautions - Familiarization with drilling machine- principal parts, work holding device, Cutting tools & tool holding device.

Marking and punching the lay out - Drilling and tapping operations - Drilling and Reaming operations - Counter boring and Counter sinking operations.

4. Lathe Work (67½ Hours)
Safety precautions - Familiarization with lathes- principal parts, work holding device, Cutting tools & tool holding device.

Plain turning and Step turning - Taper turning (Internal & External) - Drilling and Reaming - Boring and counter boring - Forming and grooving - Thread cutting and knurling - Combination of above operations - Eccentric turning.
DPMT  
SEMESTER – III  

MT 301- APPLIED MECHANICS & STRENGTH OF MATERIALS  

Unit I (13½ Hours)  

**Equilibrium of Forces**  

**Centre of Gravity**  
Centroid - Methods of centre of gravity of simple figures - Centre of gravity by geometrical considerations - Axis of reference - Centre of gravity of plane figures, symmetrical sections, unsymmetrical sections, solid bodies, sections with cut out holes - Simple Problems.  

**Moment of Inertia**  
Moment of Inertia of a Plane area - Units of moment of inertia - Methods of integration-Methods for finding out moment of inertia - Moment of inertia by Routh's rule - Moment of inertia of rectangular, square, triangle, circle and the semi circle section - Simple Problems.  

Unit II (7½ Hours)  

**Friction**  

**Simple Lifting Machines**  
Introduction - Types of lifting machine - Simple wheel and axle - Simple pulley- Simple screw jack - Simple Problems.  

Unit III Simple Stresses and Strains (16½ Hours)  

Concept of Stress and strain, types of stresses, strains-, Hook's law, Elasticity, Modulus of Elasticity, Stress - strain diagram, Working stress and Factor of safety, State of simple shear, Modulus of rigidity, Bulk modulus, Poisson's ratio, Relationship between elastic constants, Deformation of body due to force acting on it, Deformation of body due to self weight, Principle of superposition, Stresses in bars of varying section, Thermal stresses in simple and composite bars - Simple Problems.  

Unit IV Shear Force and Bending Moment (16½ Hours)  

Introduction, Types of loading - Shear force and bending moment, Sign conventions - Shear force and bending moment diagram - Relation between loading and bending moment - Cantilever with a point at its free end, Cantilever with a uniform distributed load - Simply supported beam with a point load at its mid-point - Simply supported beam with a uniformly distributed load - Simple Problems.  

**Deflection of Beams**  
Introduction - Methods for slope and deflection at a section - Simply supported beam with a central point load - Cantilever with a point load at its free end - Simple Problems.  

**Text / Reference Books**  

**Note:** Minimum of one assignment is mandatory from each unit.
MT 302 – ENGINEERING METROLOGY  
(54 Hours)

Unit I  
(6 Hours)

Introduction

Standards of Measurements

Unit II  
(21 Hours)


Comparators – Introduction & types of comparators, uses of comparators, difference between measuring instruments & comparators, mechanical comparators – Dial indicators, advantages & disadvantages, working principle of pneumatic comparators – solex air gauge, applications

Standard Gauges – Types of gauges, Radius gauge, Feeler gauge, Pitch Screw gauge, Taper wire & Thickness gauge, Plain gauge, Plug gauge, Snap gauge, Ring gauge, Combined limit gauge.

Unit III  
(12 Hours)


Geometrical Measurements – Straightness, Flatness, Parallelism, Squareness, concentricity.

Unit IV  
(15 Hours)

Measurement of Surface Finish -Representation of surface finish as per BIS – Methods of measuring surface finish – Surface finish measuring machines Surface roughness – guide for selection, surface roughness obtainable from various manufacturing processes, surface roughness symbols, Hardness testing.


Text / Reference Books

Note: Minimum of one assignment is mandatory from each unit.
DPMT
SEMESTER – III

MT 303 – MACHINE SHOP TECHNOLOGY - II  (54 Hours)

Unit I Milling Machines (22½ Hours)

Unit II Surface Grinding (10½ Hours)

Unit III Cylindrical Grinding (10½ Hours)

Unit IV Tool and Cutter Grinder (10½ Hours)

Text / Reference Books

Note: Minimum of one assignment is mandatory from each unit.
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PT 301 - PLASTICS MATERIALS & TESTING (40½ Hours)

Unit I Polymer Science (6 Hours)

Unit II Thermoplastic Materials (13½ Hours)
Introduction – Types – Commodity & Engineering plastics properties and applications of various plastics material - Polymer blends and alloys - Polymer composites.

Unit III Thermoset Materials (7½ hours)

Unit IV Plastics Testing (13½ Hours)
Introduction & importance of testing – Significance of Identification of plastics - necessary manufacturing properties-Assessment of properties of finished products in relation to service requirements.
Standard & specifications - National and International standards - BIS, ASTM, ISO & NABL. Identification of common plastics materials by simple tests e.g., visual inspection, density, effects of heat, combustion and solvents, analysis with common solvents. Preconditioning and test atmosphere - Testing of Mechanical, Thermal, Optical, Electrical properties, Permeability properties and Rheological properties.

Text / Reference Books
1. Plastics Materials, Brydson, J.A.
3. Polymer Science V.R. Gowariker.

Note: Minimum of one assignment is mandatory from each unit.
MTL 304 MACHINE SHOP PRACTICE – II  

Understand safety precautions

1. Milling Machine  

1.1 Familiarization with milling machine - principal parts, work holding device, Cutting tools & tool holding device.
1.2 Plain surface milling.
1.3 Slot milling-plain and angular milling.
1.4 Pocket milling.
1.5 Indexing milling.
1.6 Rotary milling.

2. Surface Grinding Machine  

2.1 Familiarization with grinding machine- principal parts, work holding device, grinding wheels.
2.2 Plain surface grinding.
2.3 Slot grinding.
2.4 Angular surface grinding.
2.5 Form grinding.

3. Cylindrical Grinding Machine  

3.1 Familiarization with cylindrical grinding machine- principal parts, work holding device, grinding wheels.
3.2 Plain, taper and step external grinding.
3.3 Straight and taper internal grinding.
3.4 Form grinding.

4. Tool and Cutter Grinding Machine  

4.1 Familiarization with Tool and cutter grinding machine- principal parts, work holding device, grinding wheels.
4.2 Grinding of single point, Form Tool, Drill, Reamer and Milling Cutters (Side face, End mill, Plain, Double angle cutters.

5. Lathe Machine  

5.1 Turning of guide pillar and guide bush.
5.2 Turning of sprue bush.
5.3 Turning of support pillar and bush.
5.4 Ejector pins and Push Back pins.
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MTL 305 CAD LAB – I (27 Hours)

1. Introduction to Computer Aided Drafting

History – application – Advantages over manual drafting – Hardware requirements – Software requirements – Different software - Auto CAD – Pro E – IDEAS and Open Source drafting software etc.; CAD basics – main menu, starting a new drawing, drawing editor, entering commands using mouse, pull down menu, getting help, data entry, entity selection, error correction.

2. Working with CAD

Setting limits of Drawing, grid, snap, co-ordinates, orthomode, zooming, drawing lines, arcs, circles, erase, undo, oops – commands, save and end commands- Editing, Adding dimensions and text, Editing drawings using various modified commands. Add dimensions and text on drawings, copy, mirror, array, fillet, chamfer, hatching the sectional views. Developing simple orthographic views and dimension it with text. Developing detailed orthographic views with all features.
1. Determination of density of plastics.
2. Determination of melt flow index of plastics.
3. Determination of moisture contents.
5. Determination of filler content.
7. Determination of water absorption.
10. Introduction to product testing - Pipe testing.
MT 401 – FUNDAMENTALS OF PLASTICS PRODUCT AND MOULD DESIGN (54 Hours)

Unit I (10½ Hours)

Unit II (22½ Hours)
Two plate mould - three plate - external undercut - split mould, Side cores, Split and side core actuation - Finger cam - Dog leg cam - cam track - delayed action - hydraulic, internal undercut-form pin-collapsible core - loose cores, threaded inserts - internal and external threads- unscrewing moulds-hot runner moulds.

Unit III (10½ Hours)
Blow Mould Design - Types of blow moulds - extrusion - injection and stretch blow moulds - blow ratio - parison design - pinch off design - parting line - clamping force - mould venting, mould cooling - mould alignment.

Unit IV (10½ Hours)
Compression Mould Design - Types of compression mould, open flash, semi-positive type, positive, displacement moulds, types of loading chambers, bulk factor, flash thickness, pot design, projected area, compression pressure, clamping force, no. of impression by technological method, heating system, types of heaters, heat loss, heat requirement & heater capacity.
Transfer Mould Design - Types of transfer moulds, integral pot transfer mould, auxiliary ram transfer mould, transfer pot design, projected area, transfer pressure, clamping force, pressure pad design, design of sprue, runner and gate, advantages and disadvantages of transfer mould - design related calculations.

Text / Reference Books
1. Plastics Product Design Beck, R
2. Injection Mould Design – Pye R.G.W
3. Injection Moulds 130 Proven Design Gastrow

Note: Minimum of one assignment is mandatory from each unit.
DPMT SYLLABUS

MT 402 – DESIGN OF MACHINE ELEMENTS (54 Hours)

Unit I (13½ Hours)
Introduction to design process-basic procedure of machine design- basic requirements of machine elements-design of machine elements-factors to be considered when designing a machine element-types of loading-basic definitions of mechanics (mass, weight, pressure, stress, torque, bending moment, momentum, couple, work, power)-mechanical properties of materials-selection of materials- Design stress and working stress – factor of safety- direct, bending, tensile and impact stress equations-theory of failures-simple problems.

Unit II (16½ Hours)
Design of Shafts-types of shafts-shaft material-allowable stress for shaft, Design of shaft based on strength-design of solid and hollow shafts subject to twisting and bending moment, Design of shaft based on rigidity-torsional and lateral rigidity -simple problems.


Unit III (10½ Hours)

Unit IV (13½ Hours)


Text / Reference Books

Note: Minimum of one assignment is mandatory from each unit.
MT 403- MOULD MANUFACTURING TECHNIQUES

Unit I

Types of Mould Steels: Mild Steel, Alloy Steel, Die Steel etc, Mould steel requirement – characteristics – alloying elements – material selection for different parts of the Mould and their heat treatment.


Unit II

(16 12 Hours) (16 12 Hours)

Unit III

(10½ Hours)


Unit IV

(9 Hours)

Mould assembly-check list for mould assembly-fitting and assembly of various mould elements- core insert, cavity insert, sprue bush-ejection system assembly-blue matching and die spotting-venting -final inspection-fitting of locating ring and carrier bar- mould trial.

Text / Reference Books

2. Plastics Moulds and Dies, Sors.
3. Injection Moulds, V.D.I.

Note: Minimum of one assignment is mandatory from each unit.
PT 401 – PLASTICS PROCESSING TECHNIQUES (40½ Hours)

Unit I (13½ Hours)

**Injection Moulding** - Basic principles - Types of injection moulding machines - specifications - Various parts of injection moulding machine and its functions - process variables - temperature - pressure - time - moulding cycle - types of clamping - Mould setting - Shrinkage control - defects - causes and remedies of the common moulding faults - operator safety and routine quality control.

Introduction to Advance Injection Moulding Processes - Gas assisted injection moulding, Reaction injection moulding, Multi-colour injection moulding.

Unit II (10½ Hours)


Extrusion of film, pipe, sheet, profile and coating - dies for different extrusion process - sizing units - hauloff units - process control systems - process variables - operator safety and routine quality control.


Unit III (9 Hours)


Unit IV (7½ Hours)


**Rotational Moulding** - Basic principle - Material selection & Estimation through trial analysis - Type of machine - Process variables - Charge size - Wall thickness control - Heating and Cooling system process requirement for the moulding of water tank - Dust Bin, etc.


Text / Reference Books

1. Injection Moulding Theory & Practice – Rubin, Irvin.

Note: Minimum of one assignment is mandatory from each unit.
MTC 404 - MOULD MANUFACTURING PRACTICE - I

Development of various Hand moulds (Injection/Blow/Compression/Transfer).

1. Familiarization of conventional machine tools-lathe-milling-surface grinding-cylindrical grinding tool and cutter grinding, cutting tools and cutting fluids.

2. Turning of mould elements-Sprue bush, guide pillar, guide bush, ejector pins etc.

3. Familiarization of cylindrical grinding operation to maintain functional dimensions of hardened guide pillar, guide bush, core and cavity and other elements of mould.

4. Rough machining using shaping machine (Bolster/Mould plates).

5. Surface grinding of mould plates and mould elements.

6. Drilling, reaming and tapping of mould plates and mould element.

7. Precision machining of guide pillar & guide bush holes in mould plates using Jig boring machine.


9. Machining of Core and Cavity of moulds using precision machine tools.

10. Machining of intricate shapes of Core and Cavity (soft/hardened) using EDM.

11. Polishing of core, cavity, sprue bush, runner, gate etc to mirror finish.

DPMT
SEMESTER – IV

MTL 405 – CAD LAB - II  (27 Hours)

1. Working with CAD
   Production drawing development for various mould elements and mould base design in CAD.

2. 3D Modeling Exercises
   3D part design-core and cavity design, electrode design.
PTL 402 – PLASTICS PROCESSING LAB  (40½ Hours)

1. Injection Moulding Machine - Semi Automatic  (7½ Hours)

(i) Safety precautions to be taken in Shop floor
(ii) Study of Semi Automatic Injection Moulding machines of all types in IRO, Comparative study of Pneumatic type & Hydraulic type of machines, Operating Principle, Line diagrams with nomenclature of parts, Machines specifications.
(iii) Operational practice of Pneumatic & Hydraulic type of Semi automatic Injection moulding machines to produce components in different moulds. Cycle-time analysis, observations of Process- Parameters & Procedure. Recording the observation and results in practical record books.

2. Injection Moulding Machine – Automatic  (7½ Hours)

Study of machine Parts & function, Study of clamping systems, Technical specifications, study of process sequence, Study & definitions of terms related to machine operation e.g. Machines Day light, Locating Ring, Dimensions, ejector-stroke, Tie-Bar distance, Machine Platen sizes & mould clamping arrangements. Definitions of all Processing Parameters & study of controls in machines, Recording the observations and results in practical record books.

3. Blow-Moulding - Semi-Automatic and Fully Automatic  (6 Hours)

Study of Blow Moulding machines, Free-sketch of machine with parts & study of part-function, Technical specifications of machine, Mould clamping, operational practice with different moulds, familiarisation with control-switches / valves on the machine, cycle-time analysis & operational procedure of machine, Recording the observations and results in practical record books.

4. Compression and Transfer moulding  (7½ Hours)

(i) Study of compression moulding machine in IRO, Free sketch of parts & study of part-function, comparison of compression moulding machine with Injection Moulding machine.
(ii) Operating Principle of Compression Press, mould setting procedure & parameter setting, operational practice on different compression and transfer moulds, Machine specification, Recording the observations and results in practical record books.

5. Extrusion Process  (6 Hours)

(i) Study of Extruders in IRO, Free sketch of machines, their parts and functions, Products manufactured by Extrusion process, Study of different types of extrusion process.
(ii) Operational practice by Trainees on setting up of Process parameter to produce Blown Film, observations on extruder output, size of film produced and technical specifications of machines to be recorded.

6. Introduction to Maintenance  (6 Hours)

MT 501 – ADVANCED MOULD MANUFACTURING TECHNIQUES (54 Hours)

Unit I (10½ Hours)

**NC Machines** – Basic components of NC system - NC procedure- NC coordinate systems -
Types of motion – NC format - Numerical control vs Conventional machine tools -
Advantages & Disadvantages of NC machines.

**CNC Machine Tools** - Introduction - Comparison of CNC with NC system-functions of CNC
Control in Machine tools-types of CNC system-According to - types of motion control
systems, programming modes & control loops– Analog and digital controls, Modes of
machine operation in CNC machine, Advantages & Disadvantages of CNC machines.

**DNC system**- components of DNC system - Advantages of DNC, Combined DNC and CNC
system.

Different types of CNC machine tools - safety & maintenance of CNC machines.

Unit II (24 Hours)

**Milling and Machining Centre** – classification of CNC milling machine - cutting tools and tool
holding devices-work holding devices- part programming structure and format-coordinate
system for CNC milling- Preparatory and miscellaneous functions and formats of CNC
milling programs-Canned cycles for CNC milling operations-simple programming for CNC
milling operation for making mould elements.

**Lathe and Turning Centre** - Difference between machining centre and turning centre-axis
designation of CNC lathe- types & classification of CNC lathe- cutting tools and tool holding
devices-work holding devices- part programming structure and format-coordinate system for
CNC lathe- Preparatory and miscellaneous functions and formats of CNC turning programs-
Canned cycles for CNC turning operations-simple programming for CNC lathe operation for
making mould elements.

Unit III (10½ Hours)

**CNC EDM** – Introduction, principles of operation, theory of metal removal, electrode size,
advantages and disadvantages of EDM - simple programming for CNC EDM operation for
making mould elements.

**CNC Wire EDM** - Introduction and applications-Selection of wire- simple programming for
CNC wire EDM operation for making mould elements, U, V axes.

Unit IV (9 Hours)

**Polishing Technology in Mould Making:** Definition of surface roughness, basis of
polishing technology - Effect of mould materials on polishability, Types of polishing tools,
Methods of polishing - Basic information on ultra sonic polishing – Principles of Electro
deposition in damaged moulding surfaces/Protective Coating.

**Surface Texturing of Moulds** – Process description, types of moulds, types of patterns and
mould shapes, metals that can be etched, mould preparation, limitations of chemical
texturing.
Text / Reference Books

2. Plastics Moulds and Dies, Sors.
3. Injection Moulds, V.D.I.
4. Computer Numerical Control Machines (CNC), Radhakrishnan, P.
5. Fundamentals of Numerical Control Lock Wood F.B.
7. CNC Technology & Programming Krar & Gill.
8. Numerical Control of Machine Tools Martin S.J.

Note: Minimum of one assignment is mandatory from each unit.
MT 502 - PROCESS PLANNING AND COST ANALYSIS (40½ Hours)

Unit I  Introduction (10½ Hours)
Scope of Industrial Engineering – concepts of industry – production and productivity – difference – importance – methods of increasing productivity – expectations for productivity. Time study- Norms & component/ operation cycle time, tag time, stage time, allowance as per ILO.

Unit II Process Planning (10½ Hours)

Unit III  Cost Estimation (9 Hours)

Unit IV Manufacturing Cost Estimation (10½ Hours)
Estimation of weights and materials – principles of dividing its component drawing into simpler and smaller geometrical configurations – calculation of volumes and weight of material - estimation of cost – exercise the calculation of weight of material and cost– estimation of machine times – basic formulae for calculation of machining times for the operation such as turning – drilling –shaping – boring – screw cutting – grinding – milling – use of standard tables for feeds and cutting speeds – exercises in calculating the machine times for the above mentioned operations – simple problems based on DFM (Design For Machine) & DFA (Design For Assembly)

Text / References Books

Note: Minimum of one assignment is mandatory from each unit
MT 503 – JIGS, FIXTURES AND GAUGES

UNIT I Basics of Jigs and Fixtures

UNIT II Principles of Location and Clamping


UNIT III Jig Bushings:


UNIT IV Gauges

Text Books:
2. Kempster, "Introduction to Tool Design and Jigs and Fixtures", ELBS.

References Books:
1. ASTME, "Hand book of Fixture Design".
4. Houghton, "Jigs & Fixture Design".
5. P.H.Joshi "Jigs & Fixtures".

Note: Minimum of one assignment is mandatory from each unit.
DPMT
SEMESTER – V

MTL 504 - MOULD MANUFACTURING PRACTICE – II (324 Hours)

Development of Automatic injection, compression, transfer and blow moulds

1. Familiarization of conventional machine tools-lathe-milling-surface grinding-cylindrical grinding-tool and cutter grinding, cutting tools and cutting fluids.


3. Rough machining of Sprue bush, guide pillar, guide bush, ejector pins etc.

4. Familiarization of cylindrical grinding operation to maintain functional dimensions of hardened guide pillar, guide bush, core and cavity and other elements of mould.

5. Rough machining using shaping machine (Bolster/Mould plates).

6. Surface grinding of mould plates and mould elements.

7. Drilling, reaming and tapping of mould plates and mould element.

8. Precision machining of guide pillar & guide bush holes in mould plates using Jig boring machine and CNC milling machine.


11. Machining of intricate shapes of Core and Cavity (soft/hardened) using CNC EDM & CNC Wire EDM.

12. Polishing of core, cavity, sprue bush, runner, gate etc to mirror finish.


15. Inspection of various systems of mould (Aligning system / core / cavity / cooling system / ejector system / feeding system / venting system / clamping system / moulding surface polishing etc.).
DPMT
SEMESTER – V

MTL 505 – CNC LAB (40½ Hours)

1. Familiarisation of NC & CNC machine tools.
2. Familiarisation of cutting tools and cutting fluids.
3. Programming and operating of CNC lathe machine.
4. Programming and operating of CNC milling machine.
5. Programming and operating of CNC EDM.
6. Programming and operating of CNC Wire-EDM.
MT 601– APPLIED MOULD ENGINEERING (40½ Hours)

Unit I (13½ Hours)

Fits and Tolerances - Need of preparing a manufacturing drawing - components of a production drawing Limits, Dimensional tolerance – Hole basis and shaft basis system- Select dimensions form B. I. S. standard to obtain clearance, transition and interference fit for a given set of mating parts. Computation of fits and tolerances form B. I. S. table – Preparation of drawings of mating parts and representation of fits and tolerances, Allowances.


Unit II (13½ Hours)


Unit III (6 Hours)

Standard mould parts- different standards -List of standard mould elements-Advantages of using standard items in mould making-Selection of standard mould elements.

Unit IV (7½ Hours)

Rapid Prototyping & Tooling

Text / Reference Books

Note: Minimum of one assignment is mandatory from each unit.
Unit I (7½ Hours)

Principles of Management
Introduction – meaning of management: - Management as an art of getting things done, management as a process, management as an activity, Management and administration – Development of management theory: - Taylor’s scientific management.

Functions of Management
Planning, Organizing, Staffing, Directing, Controlling, Decision making

Organizational Structure
Definition of organization, different types of organizational structure: -line, functional, line & staff organization (brief description with advantages & disadvantages), Leadership, Motivation and Communication

Human Resource Management

Unit II (9 Hours)

Quality Planning and Control
Definitions of quality, Requirements of quality, list objectives of quality planning – quality control: -operator’s quality control, inspectors quality control, Mangers quality control, total quality control.
Quality Assurance: - Concept, definition, responsibility of quality assurance department, planning for quality assurance, based on reliability engineering.

ISO 9000 & Implementation

Concept of TQM and Organizational Excellence
Concept, ten mantras of TQM, the link between ISO 9000 and TQM with the help of TQM Model –organization of TQM. Techniques of TQM - PDCA, Total Employee Involvement (TEI), POKA –YOKE – Failure proofing, JIT manufacturing and TQC (Total quality control) importance of CI (continuous improvement), 5S principles. Quality Circles - concept, characteristics, Brain storming method for solving Q.C. Problems. Small group activation.

Unit III (12 7½ Hours)

Material Requirement Planning (MRP)
Unit IV

Industrial Psychology
Meaning, importance of good working conditions and environment: physical working conditions, psychological working conditions, working conditions related to time, related to social situation. Behavioural dynamics: self concept and self understanding, interpersonal needs, developing interpersonal relationship: developing mutual expectations, honouring psychological contacts, developing trust & influence, projecting positive qualities and hiding negative points – developing better behaviour and qualities a TQM approach: conducting “SWOT” analysis for self understanding, prepare incremental projects to reduce weakness and threats – mission statement

Small Scale Industries – Entrepreneur
List steps required to start small scale industry, procedure for registration (provisional and permanent registration) – sources of financial assistance, govt., assistance for development of SSI, preparation of project report, Tax: an overview of income tax – excise duty, sales tax – procedure to be followed for sales tax

Unit V

Industrial Safety
Define Accident, Frequency rate, severity rate, and accident proneness. List the causes of accidents: Mechanical, Environmental, personnel factors accident prevention techniques – 4 E’S of Accident prevention technique

Environmental Pollution and Control
Ecology and Eco system, Impact of industrial development on environment, Causes and effects of air and water pollution on plant, animal life and material, Characteristics of industrial and municipal waste, Treatment processes: Primary, secondary and territory, Sources of air pollutants on human beings, Effects of air pollutants on human beings, Prevention and control of air pollution, Solid waste management, Environment pollution control legislation and functions of pollution control boards, Causes of noise pollution and its control.

Text / Reference Books

Note: Minimum of one assignment is mandatory from each unit.
MTL 603 – CAM & CNC LAB  

(40½ Hours)

1. Familiarisation with CAM software.
2. Familiarisation with CNC lathe / CNC milling / CNC EDM / CNC Wire EDM.
3. Study of international standards G-Codes, M-Codes.
4. Familiarisation of various cutting tools used for CNC machines.
5. Developing CAM programme for various elements of moulds.
6. Familiarisation CAM programme to CNC machines.
7. Machining of mould elements (3D profiles) using CAM programmes.
8. Practical exercise on CNC lathe / CNC milling / CNC EDM / CNC Wire EDM.
9. Familiarisation with CMM operations on quality control.
The following activities are envisaged in this course of study.

1. Project work for all trainees consisting a group of trainees.

2. The types of projects will have to be selected by the course in-charge in consultation with the local industries.

3. The scope of the project work should be Design and development of any one mould (Injection, transfer, compression, blow).

4. Identification and selection of a product that has a demand in the market.

5. Preparation of production / process drawing.

6. Procure the raw materials, equipments (if reqd.) and tools needed for manufacturing fully assembled mould with good quality.

7. Manufacture the mould with available facilities in the Institute.

8. Checking the finished product with original drawings of design and manufacturing with suitable modification if necessary.

9. Preparing project report consisting of production / process planning, plant layout needed for raw materials, equipments, tools, cost of manufacturing and all other details.

10. Review of project work: To develop the communication skill and work progress of the student, the project work should be reviewed at least once in a month by committee.

11. The final assessment of this course will be through a viva-voce by a committee comprising of industrialists and other departmental engineers.