



Veermata Jijabai Technological Institute (V.J.T.I.)

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Programme: Diploma in Mechanical Engineering(DME)

Semester: III

Implemented from: 2017

COURSE CODE	COURSE	GR	TEACHING SCHEME				EXAMINATION SCHEME												
			L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR*		OR		TW		TOTAL MARKS
								Max	Min		Max	Min	Max	Min	Max	Min			
174MA31e	Mathematics-III	B	3	1	0	4	3	80	32	20	100	40	-	-	-	-	25	10	125
174SE32	Strength of Materials	C	4	0	2	6	3	80	32	20	100	40	-	-	-	-	25	10	125
174EE33	Basics of Electrical and Electronics Engineering	C	4	0	2	6	3	80	32	20	100	40	-	-	-	-	25	10	125
174ME34	Manufacturing Processes-I	C	3	0	0	3	3	80	32	20	100	40	-	-	-	-	0	0	100
174ME35	Engineering Metallurgy	C	3	0	2	5	3	80	32	20	100	40	-	-	-	-	25	10	125
174ME36	Machine Drawing-I	C	2	0	4	6	-	-	-	-	-	-	100	40	-	-	50	20	150
174ME37	Machine Shop Practice-I	C	0	0	3	3	-	-	-	-	-	-	50	20	-	-	50	20	100
	TOTAL		19	1	13	33		400		100	500	-	150	-			200	-	850

Abbreviations: B – Basic; C – Core; A – Applied; M – Management; L – Theory Lecture; T – Tutorial; P – Practical; TH – Theory Paper; IST – In-Semester Test; PR – Practical Exam; OR – Oral Exam; TW- Term Work; GR – Grade; CR- Credits

*Assessment by Internal and External Examiners


Curriculum Coordinator


Head
Diploma in Mechanical Engineering.


Dean - Diploma



DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: MATHEMATICS III
COURSE CODE	: 174MA31

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	1	-	4	3	80	32	20	100	40	-	-	-	-	25	10	125

Course Objectives:

1. To make students well versed in various methods of integration for solving problems.
2. To impart knowledge of probability, statistics.

Course Outcomes:

Student should be able to

CO1	Apply formulae and different methods of integration in engineering concepts.
CO2	Apply definite integral to find area under curve and volume of solid of revolution.
CO3	Apply basics of statistical techniques to solve the problems.
CO4	Use concepts of probability and probability distributions in solving different problems.

Course Content:

SECTION - I								
Unit & Sub-Unit		Topics / Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1		Integration	14	20	1	40%	40%	20%
	1.1	Definition of integration. Integration of standard functions.						
	1.2	Theorems of integration						

	1.3	Methods of Integration						
		Integration by substitution Integration of rational functions. Rules of partial fractions, Integration by partial fractions. Integration by parts.						
2		Definite Integral	10	20	2	30%	30%	40%
	2.1	Definition of definite integral.						
	2.2	Properties of definite integral with simple problems.						
	2.3	Applications of definite integral						
		2.3.1 Introduction to curves- circle, parabola, ellipse, loop of the curve. 2.3.2 Area under curve. 2.3.3 Volume of solid of revolution.						
SECTION-II								
Unit & Sub-Unit		Topics/Sub-topics						
3		Statistics	06	10	3	40%	40%	20%
		Mean, Standard Deviation, Variance, coefficient of variation						
4		Elementary Probability	12	18	4	20%	60%	20%
	4.1	Revision of set theory						
	4.2	Sample space, Types of events						
	4.3	Definition of probability						
	4.4	Conditional probability						
	4.5	Independent events						
	4.6	Multiplication theorem						
	4.7	Addition theorem.						
5		Probability distribution.	06	12	4	40%	40%	20%

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: Strength Of Materials
COURSE CODE	: 174SE32

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME					EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	2	6	3	80	32	20	100	40	-	-	-	-	25	20	125

Course Objectives:

The student will be able to:

Ascertain the strength of materials under various types of loadings.

Understand the basic principle of behavior of materials.

Understand concepts of stress developed under the action of different types of forces.

Understand deformations developed under various types of forces.

Course Outcomes:

Student should be able to

CO1	Understand and Calculate various types of Stresses in simple and complex section, understand elasticity.
CO2	Plot Axial Force, Shear Force and Bending Moment diagram for determinate structural elements
CO3	Understand and Calculate deformations of the specimen subjected to uni-axial, biaxial and tri-axial stress system as well as beams.
CO4	Analyze and Design shafts and thin shells.

Course Content:

SECTION-I							
Unit & Sub-Unit	Topics/Sub-topics	Hrs.	Marks	CO	R Level	U Level	A Level
1	Stress and Strain: Hook's law. Modulus of elasticity, Modulus of rigidity, Bulk Modulus, Poisson's ratio, simple shear, complementary shear, relation between E, G, K. Behavior of mild steel under tension, load extension curve, yield stress, factor of safety, working stresses. Stresses in composite sections under axial loading..	8	10	1	30	30	40
2	Moment of Inertia: MI for plane areas, radius of gyration, MI for regular plane areas- rectangle, triangle, circle, semi-circle, hollow rectangle hollow circular section. Parallel axis theorem, perpendicular axis theorem. MI of symmetrical and unsymmetrical sections. MI of built up sections about centroidal axis.	7	10	3	40	30	30
3	Beams: Bending moments, shear force and axial forces in simply supported cantilever and overhanging beams. Plotting of B.M.D., S.F.D., and A.F.D. for concentrated and uniformly distributed loads. Relation between shear force and bending moments at a section, point(s) of contraflexure.	9	10	2	40	30	30
4	Simple theory of Bending: Flexure formula for straight prismatic beams, Principle axes second moment of area of a section, moment of resistance, simple problem in application of flexure formula, flitched beams.	8	10	2,3	40	30	30
		32	40				

SECTION- II							
Unit & Sub-Unit	Topics/Sub-topics	Hrs.	Marks	CO	R Level	U Level	A Level
5	Shear stresses: Distributions of shear stresses across plane section and Tee and I sections.	6	8	1	40	30	30
6	Bending combined with axial loads: Eccentric loading of a section, middle third rule, core of section.	6	8	1,3	40	30	30
7	Principle stresses and Principle planes: Stresses in oblique planes, principle plane and stresses, Analytical and Graphical methods.	8	10	3	30	30	40
8	Torsion : Theory of torsion with assumptions made in it and formula, Transmission of power and conversion of Power from HP to Watt, Solid and hollow shafts.	6	8	3,4	40	30	30
9	Thin Cylindrical and Spherical shells: Definitions. Hoop stress and longitudinal stresses and strains, volumetric strain , Design and analysis problems. Applications of Principal stresses to shells.	6	6	4	30	30	40
		32	40				
	TOTAL	64	80				
Numerical Problems will be asked in the examination, based on above syllabus. Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms’s Revised Taxonomy).							

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

Term Work:

List of Practical's to be performed and Laboratory journal containing at least six experiments to be prepared and submitted.

Sr. No.	Name of Experiments	Approx. Hours	CO
1	Tension test on M.S. bar.	2	1,3
2	Briell Hardness Test on M.S., C.I. & Brass specimen	2	1
3	Izod impact test on M.S. bar and brass specimen	2	1
4	Torsion test on M.S specimen	2	1,3
5	Shear test on M.S. , C.I. brass specimen	2	1,3
6	Transverse test on Cast Iron	2	1
7	Tension Test on Cast Iron.	2	1
8	Flexure test on ISMB Section to find .Modulus Of Elasticity of steel.	2	1,3

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	S. Ramamrutham	Strength Of Materials	15 th Edition 2006, Dhanpat Rai Pub.
2	S. B. Junnarkar	Mechanics of structures	21th Edition 2010, Charotar Publishing. House

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	Schaum's Series	Solved Problems in Strength Of Materials.	TATA McGraw Hill- 2008

2	C.H. Ryder.	Strength of materials	2002, Macmillan publishers
3	Web site	https://en.wikipedia.org/wiki/Strength_of_materials	Wikipedia
4	Web site	https://youtu.be/iY_vpychVNY and many more.	Youtube


Curriculum Coordinator


Head


Dean - Diploma

Diploma in Mechanical Engineering



DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING
COURSE CODE	: 174EE33

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME					EXAMINATION SCHEME											
L	T	P	Cr	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	2	6	3	80	32	20	100	40	-	-	-	-	25	10	125

Course Objectives:

At the end of Diploma Program, student will be able to

1. Understand the concept and principle of A.C. fundamental. (ii) Select the drive for a given application. (iii) Understand basic principles of DC machines and AC machines and little bit knowledge of drives
2. Can draw and describe basic electronic circuit.

Course Outcomes:

Student should be able to

CO1	To understand principles and laws used in basic electrical engineering.
CO2	To understand the basic principles of ac and dc fundamentals.
CO3	To understand the working of different electrical machines and their applications.
CO4	To understand the working of electronic components & their applications.

Course Content:

SECTION - I								
Unit & Sub-Unit	Topics/Sub-topics	Hrs.	Marks	CO	R Level	U Level	A Level	
1	1.1 Electricity Fundamentals: Voltage, Current, Power and their relation between V, I and P	08	08	1	40%	40%	20%	
	1.2 Resistance, Ohm's Law Effect of temperature on resistance.							
	1.3 Series Circuit, Parallel Circuit							
	1.4 Kirchhoff laws.							
	1.5 Mesh analysis and Node analysis of simple electric circuits. (Problems having 2 equations only).							
	1.6 Concept of Inductor & Capacitor elements.							
	1.7 Faraday's law of Electromagnetic Induction							
2	2.1 A.C Fundamental Definition of Alternating Current and Voltage Terms related with alternating quantity	03	06	2	60%	20%	20%	
	2.2 R.M.S value, average value							
	2.3 Phasor representation of ac quantities							
3	3.1 3-Phase Circuits Concept of 3-phase circuit	03	04	2	20%	40%	40%	
	3.2 Balanced star and delta connection. Their voltage current and power relationships.							
4	4.1 Electrical Machines Construction and principle of operation of single phase transformer. EMF equation of transformer (without derivation).	16	18	3	20%	40%	40%	
	4.2 Construction and principle of operation of DC machine. EMF equation of a DC machine (without derivation).							
	4.3 Types of DC Motors - Shunt, Series, Compound, their working, speed torque characteristics and applications.							

	4.4	Types of AC Motors – Single phase Induction motor & three phase Induction motor, their working, speed torque characteristics and applications						
	4.5	Stepper Motor working principle and applications						
5	5.1	Electrical Drives Introduction of Electrical Drives and advantages	2	4	3	40%	40%	20%
	5.2	Classification Of Drives						
SECTION - II								
Unit & Sub-Unit	Topics/Sub-topics		Hrs.	Marks	CO	R Level	U Level	A Level
6	6.1	Diodes: Review of Intrinsic & Extrinsic Semiconductor materials. P type & N type Semiconductor materials. Construction of Germanium & Silicon PN junction diodes. Forward and Reverse current/voltage characteristics of diode. Temperature effect on diode.	15	18	4	20%	60%	20%
	6.2	Application of diode in Half wave & Full wave rectifier (Center Tap Transformer & Bridge type) circuits. Formula for average load voltage & current (no derivation)						
	6.3	Capacitor C and Inductor L Filter circuits						
	6.4	Zener diode operation and voltage/current characteristics. Application of Zener diode in a simple voltage regulator circuit						
	6.5	Light Emitting Diodes (LED) working, forward Characteristics & applications. Seven segment display application						
	6.6	Photodiode construction and application						
7	7.1	Bipolar Junction Transistor: Construction of PNP & NPN type of BJT.	10	10	4	20%	60%	20%
	7.2	Common Base, Emitter & Collector configurations						
	7.3	Input and output characteristics of CE configuration.						

	7.4	Current gain alpha, beta and relation between them.						
	7.5	Common Emitter small signal voltage amplifier application.						
	7.6	Common Emitter switch application						
8	8.1	Silicon Controlled Rectifier: Construction of Silicon Controlled Rectifier, its operation & characteristics	04	08	4	20%	60%	20%
	8.2	Use of SCR in single phase controlled rectifier (Converter) circuit.						
	8.3	Use of SCR in Inverter application.						
9	9.1	Digital Electronics Study of logic gates (AND, OR, NOT, NOR, NAND) Symbols and truth table.	03	04	4	40%	40%	20%
	9.2	Study of flip-flop: J-K flip flop						
	9.3	Introduction and application of microprocessors						
	9.4	Introduction to automotive electronics applications.						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxonomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

List of Practicals/Assignments/Tutorials:

Sr. No.	Practicals	Approx. Hours	CO
1	To verify Kirchhoff's Current and Voltage Laws.	2	1
2	To observe and study construction details of Transformer, DC Motors, Induction Motors.	2	3
3	To perform load test on single phase transformer and calculate its efficiency	2	3
4	To perform speed control of dc shunt motor.	2	3
5	To perform speed control of three phase slip ring induction motor.	2	3
6	To plot forward and reverse voltage/current characteristics of Germanium and Silicon diode.	2	4
7	To measure average load voltage and current for half wave and full wave Rectifier circuits.	2	4
8	To provide capacitor filter for half wave and full wave rectifier circuits	2	4

9	To plot forward V/I characteristics of Red, Green, Yellow & Blue LED's	2	4
10	To plot reverse characteristics of Zener Diode.	2	4
11	Use of Zener diode in simple voltage regulator circuit.	2	4
12	Use of Common Emitter Bipolar Junction Transistor in Voltage Amplifier	2	4
13	Use of Common Emitter Bipolar Junction Transistor as a Switch.	2	4
14	Study of single phase half wave phase controlled rectifier (Converter)	2	4
* Minimum 8 and maximum 12 practical/experiment sessions to be included in a course in a term			

Assignments

1. Numericals on Series and parallel circuits.
2. Numericals on Node and mesh analysis.
3. Construction of Dc motor
4. Classify DC motor and draw characteristics of dc motors
5. Draw V/I characteristics of Diode and Zener diode
6. Draw input and output characteristics of CE configuration
7. Construction of Silicon Controlled Rectifier, its operation & characteristics
8. Draw symbol and truth table of logic gates

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	B.L. Thereja	Fundamentals of Electrical Engineering and Electronics	S Chand Publications
2	J.B. Gupta	Basic Electrical & Electronics Engineering	S. K. Kataria & Sons Publications

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	V.K.Mehta	Principles of Power System	S Chand Publications
2	V. Kamraju	Electrical Power Distribution System	Mc.GrawHill
3	S.Sivanagaraju S.Satyanarayana	Electrical Power Transmission and Distribution	Pearson
4	Soni,Gupta, Bhatnagar	A Course in Electrical Power	DhanpatRai
5	S.L.Uppal	A Course in Electrical Power	S.K.Khanna
6	J.B.Gupta	Transmission and Distribution of Electrical Energy	S.K.Khanna


Curriculum Coordinator


Head


Dean - Diploma

Diploma in Mechanical Engineering



DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: MANUFACTURING PROCESSES - I
COURSE CODE	: 174EE34

Teaching & Examination Scheme

Teaching Scheme				Paper Hours	Examination Scheme										Total Marks	
L	T	P	Cr		Theory		Test	Total		PR		OR		TW		
					Max	Min		Ma x	Min	Max	Min	Ma x	M in	M ax		M in
3	0	0	3	3	80	32	20	100	40	-	-	-	-	-	-	100

Rationale:

Manufacturing Process is a core technology subject for mechanical engineering course. Manufacturing is the basic area for any mechanical engineering technician. The technician should be introduced to the basic processes of manufacturing. This subject will help the student to be familiarized with working principles and operations like forging, rolling, extrusion, lathe, drilling, casting, welding, brazing and soldering etc. which are the basic manufacturing processes.

The basic knowledge of these processes will be helpful to select the most appropriate process for getting the desired results in terms of getting the raw material converted to finished product as per the requirements.

Objectives:

The student will be able to

1. Know and identify basic manufacturing processes for manufacturing different components.
2. Operate& control different machines and equipments.
3. Inspect the job for specified dimensions.
4. Produce jobs as per specified dimensions.
5. Select the specific manufacturing process for getting the desired type of output.
6. Adopt safety practices while working on various machines.

Course Outcomes:

Student should be able to

CO1	Know and identify basic manufacturing processes for manufacturing different components.
CO2	Select the specific manufacturing process for getting the desired type of output.
CO3	Adopt safety practices while working on various machines.

SECTION - I							
Unit & Sub-Unit	Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1	Foundry:	08	14	1,3	10	6	8
	1.1 Types of Foundries, Advantages and disadvantages of foundry process.						
	1.2 Pattern Making- Pattern materials and their selection. Types of pattern and their selection. Pattern Allowances. Pattern colour coding.						
	1.3 Moulding : Hand Moulding tools and flasks. Moulding sand: Composition, Types and properties. Classification of moulding processes. Core, core print and core boxes.						
	1.4 Casting Gating and risering of sand castings. Types & working: Die casting and Centrifugal casting. Defects in casting : causes and remedies						
	1.5 Safety Measures for Foundry.						
2	Mechanical Working of Metals:	7	10	2	6	6	4
	2.1 Forging : <i>Forging processes - Drop forging, Upset forging, Die forging or press forging.</i> <i>Types of dies like open die, closed die (Single Impression and Multi-impression), Closed die forging operations - Fullering, Edging, Bending, Blocking, Finishing Forgeable material and forgeability</i>						
	2.2 Rolling and Extrusion <i>Principles of rolling and extrusion.</i> <i>Hot and cold rolling.</i> <i>Types of rolling mills.</i> <i>Different sections of rolled parts.</i> <i>Methods of extrusion – Direct, Indirect, Backward and impact Extrusion, Hot extrusion, Cold extrusion.</i> <i>Advantages, disadvantages and applications.</i>						

	2.3	Sheet Metal Working Cutting operations, Forming operations.						
	2.4	Safety Measures for above processes.						
3		Welding:	6	10	3	8	8	4
	3.1	Classification.						
	3.2	Gas welding techniques.						
	3.3	Types of welding flames						
	3.4	Arc Welding – Principle, Equipment, Applications.						
	3.5	Submerged arc welding.						
	3.6	TIG / MIG Welding.						
	3.7	Resistance welding – Spot welding, Seam welding, Projection welding, Percussion welding.						
	3.8	Brazing and soldering: Types, Principles, and Applications.						
	3.9	Safety Measures for Welding						
4		Plastic Moulding:	3	6	1	4	6	2
	4.1	Types of plastic						
	4.2	Compression moulding, Transfer moulding, Injection moulding, Blow moulding, Vacuum forming, Extrusion, Calendering.						
SECTION - II								
Unit & Sub-Unit	Topics/Sub-topics		Hrs	Marks	CO	R Level	U Level	A Level
5		The Lathe	10	16	2	10	8	8
	5.1	Types of lathes – light duty, Medium duty and heavy duty geared lathe, CNC lathe.						
	5.2	Specifications.						
	5.3	Basic parts and their functions. Operations and tools – Turning, parting off, Knurling, Facing, Boring, drilling, threading, step turning, taper turning.						
	5.4	Angle calculations for taper turning.						
	5.5	Cutting tool nomenclature and tool signature.						
	5.6	Cutting parameters and machining time calculation						
	5.7	Attachments						

	5.8	Turret and Capstan Lathe						
6		Single Point Cutting Tools:	08	12	1	6	4	6
	6.1	Geometry of single point cutting tools						
	6.2	Effect of tool geometry on cutting parameters such as speed, depth of cut, cutting fluids and surface finish.						
	6.3	Types of single point cutting tools - Solid, Tipped, Brazed tip, Throwaway inserts and Adjustable inserts.						
	6.4	Tool life. Factors affecting the tool life.						
7		Shaper/Planner/Slotter	06	12	2	4	6	6
	7.1	Principle of working.						
	7.2	Operations,						
	7.3	Advantage and disadvantages						
	7.4	Applications.						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxonomy).								

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	P.C. Sharma	Production Technology	S. Chand Publications, Third Edition-2009

Reference Books:

Sr. No.	Author	Title	Publisher and Edition
1	B.S.Raghuvanshi	Workshop Technology - Volume I & II	DhanpatRai&Co , Ninth Edition 2002
2	R.K. Rajput	Manufacturing Technology - Volume I & II	Laxmi Publication (P) Ltd. First edition 2007
3	S.K. HajraChaudhary	Workshop Technology - Volume 1	Media Promoters and Publishers limited, Eighth edition-1986


Curriculum Coordinator


Head


Dean - Diploma

Diploma in Mechanical Engineering



DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIED
COURSE TITLE	: ENGINEERING METALLURGY
COURSE CODE	: 174ME35

TEACHING AND EXAMINATION SCHEME:

Teaching Scheme				Paper Hours	Examination Scheme											Total Marks
L	T	P	Cr		Theory		Test	Total		PR		OR		TW		
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	0	2	5	3	80	32	20	100	40	-	-	-	-	25	10	125

Course Objectives:

- Know the properties of engineering materials like Metals, non-metals, ferrous metals and non-ferrous metals.
- Interpret Iron-Iron Carbide phase equilibrium diagram to find temperature for heat treatment process.
- Select the proper materials for different applications like cutting tools, dies, gears and other applications.
- Understand various heat-treatment process and its applications for various components to improve its mechanical properties.
- Understand powder metallurgy process and its application.
- Understand Non destructive testing methods and its application.

Course Outcomes:

Student should be able to

CO1	Classify and identify properties, composition and applications of Engineering Materials.
CO2	Interpret Equilibrium Diagrams and their significance.
CO3	Select appropriate heat treatment process, NDT technique, powder metallurgy for specific requirements

Course Content:

Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1	1.1	Engineering Materials and their Properties – Introduction, classification and application of Engineering Materials.	02	05	CO1	20	40	40
	1.2	Physical Properties – Structure, Density, Melting Point. Mechanical Properties- Strength, elasticity, Malleability, plasticity, toughness, hardness, brittleness						
2	2.1	Crystallisation of liquid into solid state, Nucleation and growth in metals and alloys. Formation of polycrystalline and single Crystals.	03	05	CO1	40	40	20
	2.2	Classification of crystal structure. FCC, BCC and HCP lattice. Lattice structure, unit cell, packing density and co-ordination number.						
3	3.1	Constitution of Alloys–Introduction, significance of alloying, Classification and properties of different types of alloys, pure metal, interstitial and intermetallic compounds, solid solution and its types.	07	12	CO2	20	40	40
	3.2	Phase rule, cooling curves for pure metals and alloys, phase diagrams.						
	3.3	Equilibrium diagram of a binary system in which there is a complete solubility in liquid and solid state (copper – nickel phase diagram)						
	3.4	Equilibrium diagram of a binary system in which there is complete solubility in the liquid state and complete insolubility in solid state (Lead - Antimony phase diagram).						
	3.5	Equilibrium diagram of a system in which complete Solubility in liquid state and limited solubility in solid state and solid solubility decrease with the temperature (Lead - tin phase diagram).						
4		Ferrous Metals	08	14	CO1	40	30	30
	4.1	Classification. Properties and Uses of Plain Carbon Steels,						

	4.2	Alloy Steels: Classification, purposes of alloying, effect of alloying elements, nickel, chromium, manganese, Molybdenum, tungsten; Vanadium, silicon, Manganese steels						
	4.3	Stainless Steel: Classification, properties and uses. Tool Steels: Classification, properties, uses, heat treatment of tool steels.						
	4.4	Cast Irons— White, gray, Malleable, chilled, S.G. Machinable Cast iron, alloy cast irons.						
	4.5	Effect of constituents, such as silicon, sulfur, Manganese, phosphorous on cast iron. Mechanical properties and uses of different-cast iron.						
5		Iron - Carbon Equilibrium Diagram –	09	12	CO2	40	30	30
	5.1	Importance of Iron as Engineering material, Allotropy of iron.						
	5.2	Introduction and study of transformation in Equilibrium diagram, definition of structures, study of microstructures.						
	5.3	Effect of carbon content on structure and properties of plain carbon steels, critical temperature lines, and effect of minor constituents.						
SECTION-II								
Unit & Sub Unit			Hours	Marks	CO	R	U	A
6		Heat - Treatment of Steels—	9	14	CO3	30	30	40
	6.1	TTT Diagram						
	6.2	Introduction to the Technology of Heat treatment, classification of heat treatment process.						
	6.3	Annealing, normalizing, hardening and tempering of steels.						

	6.4	Surface heat treatments (case hardening) a) Chemical heat treatments such as carburizing, nitriding, cyaniding. b) Flame hardening, Induction hardening.						
7.		Non - Ferrous Metals and Alloys –	04	06	CO1	40	30	30
	7.1	Copper and its alloys- Properties, Alloys, Applications						
	7.2	Aluminum and its alloys Properties, Alloys, Applications						
	7.3	Nickel and its alloys Properties, Alloys, Applications						
	7.4	Zinc and its alloys Properties, Alloys, Applications						
	7.5	Lead and its alloys Properties, Alloys, Applications						
8	8.1	Introduction To Nanoscience And Nanotechnology	03	06	CO1	20	40	40
	8.2	Basic concepts of Nanoscience and Nanotechnology, Quantum wire, Quantum Well, Quantum dot , fullerenes, Graphene, Carbon nanotubes						
	8.3	Material processing by chemical vapor deposition and physical vapor deposition – Principle of SEM, TEM, AFM, Scanning near-field optical microscopy (SNOM) – Scanning ion-conducting microscopy (SCIM)						
	8.4	Potential uses of nanomaterials in electronics, robotics, computers, sensors, sports equipment, mobile electronic Devices, vehicles and transportation, Medical applications of nanomaterials.						
9		Powder Metallurgy	03	06	CO3	30	30	40
	9.1	Powder metallurgy process, preparation of the metal powder, Characteristic of metal powders, mixing compacting, sintering.						
	9.2	Advantages and disadvantages of powder metallurgy, application of powder metallurgy.						
10		Non Destructive Testing–	03	06	CO3	30	30	40
	10.1	Importance of Non-destructive testing. Difference between Destructive and						

		Nondestructive testing.						
	10.2	Nondestructive testing methods- Radiography x-ray gamma ray, Magnetic Particle Inspection, fluorescent penetrant test, Ultrasonic Test, Eddy Current test. Applications of these tests						

Legends: R-Remember, U-Understand, A-Apply

List of Practicals/Assignments/Tutorials:

1. Develop specimen for metallographic examination, to reveal out it is microstructure.
2. Develop specimen for metallographic examination, to reveal out it is microstructure.
3. Study of Optical metallurgical microscope to understand the construction & working principle of metallurgical microscope.
4. Hardness measurement on Brinell/Vickers hardness test
5. Tutorial on Phase Diagram
6. Heat treatment process and their applications.
7. Jominy end quench test for evaluation of hardenability of given materials.
8. Tutorial on TTT Diagram
9. Study of Ferrous metals and Non ferrous metals and alloys.
10. Visit the website of any two Steel manufacturers and compare their product specifications.

Students shall submit journal containing term work, practicals, assignments based on syllabus.

Text Books:

Sr.No.	Author	Title	Publisher and Edition
1.	V. D. Kodgire	Material Science and Metallurgy	Everest Publishing House, 39th Edition 2017.
2.	O.P.Khanna	Material Science and Metallurgy	Dhanpat Rai and Sons, 2nd Edition, 2014

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1.	William D. Callister	Material Science and Engineering	John Wiley & Sons
2.	ASM International	Practical Heat treating	ASM International


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Diploma in Mechanical Engineering




Dean - Diploma

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: MACHINE DRAWING - I
COURSE CODE	: 174ME36

Teaching & Examination Scheme

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		Pract		Oral		Term work		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
2	-	4	-	-	-	-	-	100	40	-	-	50	20	150	

Rationale: The subject Machine Drawing – I deals with more complicated problems on sections of solids, reading orthographic views. Apart from this the course contains the topics as intersection of solid surfaces, different types of fasteners, keys, couplings & joints. This course envisages reinforcing and enhancing the knowledge and skills acquired in the earlier two courses viz. Engineering Graphics I & Engineering Graphics II.

Course Objectives : At the end of this course students will be able to

CO 1	To draw geometrical shapes in different positions using drawing conventions.
CO 2	To list / name / sketch different types of machine parts, assemblies etc
CO 3	To imagine shapes and sizes of components and visualize / draw their views in different directions

Course Content:

Part I –Theory

Sr. No	Contents	Hours	Marks	CO	R Level	U Level	A Level
SECTION – I							
1	Projections of Solids: Axis of solids inclined to both H.P. and V.P.	4	15	1	0	50	50
2	Intersection of surfaces: Curves of inter-penetration	4	25	1	0	50	50

	when a cylinder, prisms, pyramid or cone is penetrated by either a cylinder or a prism vertically and/ or horizontally as per the case						
SECTION – II							
3	Reading advanced multi views orthographic projections: Complex shaped machine parts including sectional views.	9	16	3	0	50	50
4	Auxiliary Projections.	2	08	1	0	50	50
5	Permanent fasteners: Welded joints and their symbolic representations. joints	1	3	2	40	30	30
6	Detachable fasteners: Free hand sketches of various threaded fasteners., special purpose bolts, special purpose nuts, set screws and foundation bolts, locking arrangements of nuts, types of threads, Left & right hand threads, multi start threads etc	5	3	2	40	30	30
7	Different types of keys- parallel keys, cylindrical keys, woodruff keys, peg keys etc. selection of keys as per shaft dimensions.	1	3	2	40	30	30
8	Types of couplings – flanged, protected, flexible, muff, Split muff type and universal joint etc	1	3	2	40	30	30
9	Cotter Joints and knuckle joints- their types: Spigot and socket type, sleeve type, strap type, gib and cotter type, double gib type etc.	1	4	2	40	30	30
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms’s Revised Taxonomy).							

Part II- Practicals

Sr No	Topic	Drawing Sheets
1	Projections of solids	4
2	Intersection of solids	4
3	Missing Views	9
4	Auxiliary views	2
5	Free hand sketches	9

Practical (Term work)

Students should prepare one A2 size sheet on every practical day based on that day’s lecture. These sheets will be assessed regularly. As a part of exercise in the free hand sketching, students should visit textile workshop, automobile lab, heat engine lab, mechanical workshop etc. to get acquainted with machine elements. Adequate number of assignments about 25 (including drawing sheets and free hand sketches as mentioned above) are expected in a semester.

Learning Resources:

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	N.D.Bhat	Engineering Drawing	Charotar Publishers,49th Edition 2010
2	N.D Bhatt	Machine Drawing	Charotar Publishers,38th edition 2003

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	P.S.Gill	Machine Drawing	S.Kataria& sons, 3rd edition 2007
2	Siddeshwar	Machine Drawing	Tata McGraw Hill Publications,2005


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Diploma in Mechanical Engineering



DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: THIRD
COURSE TITLE	: MACHINE SHOP PRACTICE - I
COURSE CODE	: 174ME37

Teaching & Examination Scheme

Teaching Scheme				Paper Hours	Examination Scheme										Total Marks	
L	T	P	Cr		Theory		Test	Total		PR		OR		TW		
					Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
0	0	3	3	-	-	-	-	-	50	20	-	-	50	20	100	

Rationale:

Manufacturing Process is a core technology subject for mechanical engineering course. Manufacturing is the basic area for any mechanical engineering technician. The technician should be introduced to the basic processes of manufacturing. This subject will help the student to be familiarized with working principles and operations like forging, rolling, extrusion, lathe, drilling, casting, welding, brazing and soldering etc which are the basic manufacturing processes.

The basic knowledge of these processes will be helpful to select the most appropriate process for getting the desired results in terms of getting the raw material converted to finished product as per the requirements.

Objectives:

The student will be able to

1. Know and identify basic manufacturing processes for manufacturing different components.
2. Operate & control different machines and equipments.
3. Inspect the job for specified dimensions.
4. Produce jobs as per specified dimensions.
5. Select the specific manufacturing process for getting the desired type of output.
6. Adopt safety practices while working on various machines.

Course Outcomes:

Student should be able to

CO1	Inspect and produce the job as per specified dimensions.
CO2	Operate, control different machines and adopt safety practices while working on various machines.

Sr. No.	Details Of Practical Contents	Hours	Marks	CO	R Level	U Level	A Level
01	PATTERN MAKING One job on single piece pattern. One job on split pattern.	24	50	1	4	6	2
02	MACHINE TOOL DEMONSTRATION: Machines such as drilling machine, shaper, grinding and milling machines should operated and demonstrated.	24	50	2	4	8	8
Legends: R- Remember, U – Understand, A – Apply							

Reference Books:

Sr. No.	Author	Title	Publisher and Edition
1	B.S.Raghuvanshi	Workshop Technology - Volume 1 & 2	DhanpatRai&Co , Ninth Edition 2002
2	R.K. Rajput	Manufacturing Technology - Volume I & II	Laxmi Publication (P) Ltd. First edition 2007
3	S.K. HajraChaudhary	Workshop Technology - Volume 1	Media Promoters and Publishers limited, Eighth edition-1986


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