

CURRICULUM

FOR

THIRD SEMESTER

DIPLOMA IN

MECHANICAL

ENGINEERING

SUBJECT STUDY SCHEME (3RD Semester: Mechanical Engineering)

Course Code	Subjects	Time in Hours				Credits			
		Theory	Tutorial	Practical	Total	Theory	Tutorial	Practical	Total
MEPC301	Thermal Engineering-I	3	0	-	3	3	-	-	3
MEPC302	Strength of Materials	2	1	-	3	2	1	-	3
MEPC303	Metrology & Quality Control	3	0	-	3	3	-	-	3
ES301	Fundamental of Electrical and Civil Engineering	3	0	-	3	3	0	-	3
MEPC304	Product Design and Development	3	0	-	3	3	-	-	3
MEPC305	Manufacturing Technology – II	3	0	-	3	3	-	-	3
MEPC306	Thermal Engineering- I	0	0	2	2	0	0	1	1
MEPC307	Strength of Materials	0	0	2	2	0	0	1	1
MEPC308	Metrology & Quality Control	0	0	2	2	0	0	1	1
MEPC309	Manufacturing Technology – II	0	0	2	2	0	0	1	1
AU301	Indian Constitution	2	0	0	2	0	0	0	0
	Total	19	1	8	28	17	1	4	22

- **Note: 2 hrs in a week shall be utilized for sports and other activities like debates, seminars etc.**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC301	Course Title: Thermal Engineering –I (Theory)
Semester: 3rd	Credits: 03
Hours Per Week : 3 (L: 3, T: 0, P:0)	

COURSE OBJECTIVE:

The main objective of this course to impart knowledge to students about the concept of basic thermodynamic systems, different thermodynamic laws and system property relations and their applications and to provide the students about the concept of air cycles, steam generators, and concept of heat transfer

COURSE CONTENT**1. Fundamental Concepts**

- 1.1** Thermodynamic state and system, boundary, surrounding, universe
- 1.2** Thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive,
- 1.3** Thermodynamic equilibrium, quasi – static process, reversible and irreversible processes
- 1.4** Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy, internal energy.

2. Laws of Perfect Gases

- 2.1** Definition of gases, explanation of perfect gas laws – Boyle's law, Charles's law, Avagadro's law, Regnault's law, Universal gas constant, Characteristic gas constants, derivation.
- 2.2** Specific heat at constant pressure, specific heat at constant volume of gas, derivation of an expression for specific heats with characteristics, simple problems on gas equation

3. Thermodynamic Processes on Gases

- 3.1** Types of thermodynamic processes – isochoric, isobaric, isothermal, hyperbolic, isentropic, polytropic and throttling processes, equations representing the processes
- 3.2** Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes

4. Laws of Thermodynamics

- 4.1** Laws of conservation of energy,
- 4.2** First law of thermodynamics (Joule's experiment), Application of first law of thermodynamics to non-flow systems – Constant volume, constant pressure, Adiabatic and polytropic processes,
- 4.3** Steady flow energy equation, Application of steady flow energy to equation, turbines, pump, boilers, compressors, nozzles, evaporators, limitations.
- 4.4** Heat source and heat sinks, statement of second laws of thermodynamics: Kelvin Planck's statement, Clausius statement, equivalence of statements, Perpetual motion Machine of first kind, second kind,
- 4.5** Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility, entropy.

5. Properties of Steam

5.1 Formation of steam and related terms, thermodynamics properties of steam, steam tables, internal latent heat, internal energy of steam, entropy of water, entropy of steam, T- S diagrams, Mollier diagram

5.2 Quality of steam (dryness fraction), Rankine cycle

6. Steam Generators

6.1 Uses of steam, classification of boilers, comparison of fire tube and water tube boilers.

6.2 Construction features of Lancashire boiler, nestler boiler, Babcock & Wilcox Boiler.

7. Air Standard Cycles

7.1 Meaning of air standard cycle – its use, condition of reversibility of a cycle

7.2 Description of Carnot cycle, Otto cycle, Diesel cycle, simple problems on efficiency, calculation for different cycles

8. Air Compressors

8.1 Functions of air compressor – uses of compressed air, type of air compressors

8.2 Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done.

8.3 Multistage compressors – advantages over single stage compressors

8.4 Rotary compressors – types, centrifugal compressor, axial flow compressor, vane type compressor

9. Introduction to Heat Transfer

9.1 Modes of heat transfer

9.2 Fourier's law, steady state conduction, composite structures

9.3 Natural and forced convection, thermal radiation

COURSE OUTCOME

After completion of this course, student will be able to:

- Demonstrate basic processes and laws of thermodynamics for open and closed systems.
- Demonstrate basics of heat transfer, refrigeration and internal combustion engines
- Explain mechanism of boiler operation
- Describe the constructional features of air compressors and working of different air compressors.

RECOMMENDED BOOKS:

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi.
4. A Treatise on Heat Engineering by VP Vasandani and DS Kumar; Metropolitan Book Company.
5. Thermodynamics by Yunus A. Cengel. TMH
6. Thermal Engineering by P.L Ballney; Khanna Publishing House
7. Thermal Engineering by KS Yadav

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	09
2.	03	06
3.	06	12
4.	10	22
5.	04	09
6.	04	08
7.	04	08
8.	07	14
9.	06	12
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC 302	Course Title: STRENGTH OF MATERIALS (Theory)
Semester: 3rd	Credits: 3
Hours Per Week : 3 (L: 2, T: 1, P: 0)	

COURSE OBJECTIVE:

The main objective of this course is to comprehend the various concepts, principles, applications, and practices covering stress, strain, bending moment, shearing force, shafts, columns, and springs and to provide basic knowledge of the mechanics of materials so that students can solve real engineering problems and design engineering system.

COURSE CONTENT**1. Stresses and Strains**

- 1.1** Concept of Load, stresses, and Strain
- 1.2** Tensile compressive and shear stresses and strains
- 1.3** Concept of Elasticity, Elastic Limit, and Limit of Proportionality
- 1.4** Hook's Law, Young Modulus of elasticity, Nominal stress, Yield point, plastic stage, Ultimate strength and breaking stress, Percentage elongation, Proof stress, working stress, Thermal stresses, Factor of safety, and Shear modulus
- 1.5** Longitudinal and circumferential stresses in seamless thin-walled cylindrical shells (derivation of these formulae not required)

2. Moment of Inertia

- 2.1** Concept of the moment of Inertia and second moment of area
- 2.2** Radius of gyration, section modulus, Theorem of perpendicular axis and parallel axis (without derivation)
- 2.3** Second moment of area of common geometrical sections: Rectangle, Triangle, Circle (without derivation), Second moment of area for I, T, L, Z section.

3. Bending Moment and Shearing Force

- 3.1** Concept of beam and form of loading
- 3.2** Concept of end supports-Roller, hinged and fixed
- 3.3** Concept of bending moment and shearing force, B.M. and S.F Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L.

4. Bending stresses

- 4.1** Concept of Bending stresses, Theory of simple bending, Use of the equation $M/I = F/Y = E/R$
- 4.2** Concept of moment of resistance,
- 4.3** Bending stress diagram, Calculation of Maximum bending stress in beams of rectangular, circular, and T section, Permissible bending stress,
- 4.4** Section modulus for rectangular, circular, and symmetrical I section.

5. Columns

- 5.1** Concept of the column, modes of failure
5.2 Types of columns, Buckling load, crushing load, Slenderness ratio, Factors affecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation, Rankine Gourdan formula(without derivation)

6. Springs

- 6.1** Closed coil helical springs subjected to axial load and impact load,
6.2 Stress deformation, Stiffness, and angle of twist and strain energy,
6.3 Proof resilience, Laminated spring (semi-elliptical type only), Determination of the number of plates.

COURSE OUTCOME

After the completion of the course, the student will be able to:

- Compute stress and strain values and find the changes in axial, lateral, and volumetric dimensions of bodies of uniform section and of the composite section under the influence of normal forces.
- Evaluate the Longitudinal and circumferential stresses in seamless thin-walled cylindrical shells
- Determine the Second moment of area for I, T, L, Z section.
- Calculate thermal stresses, in bodies of uniform section and composite sections.
- Compute shear force and bending moment at any section of the beam and draw the S.F. Diagrams for UDL and concentrated loads.
- Calculate the safe load, safe span, and dimensions of the cross-section under bending stresses.
- Compute the stress and deflection of the closed coil helical spring.

RECOMMENDED BOOKS

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi, 2013
3. Strength of Materials – S. Ramamrutham, Dhanpat Rai & Publication New Delhi
4. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi
5. A Text Book strength of Material– R.K. Bansal, Laxmi Publication New Delhi
6. Mechanics of Solid by Singh and Jha, New Age International Publishers
7. Mechanics of Solid by LS Srinath, TMH publication

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	08	18
2	08	18
3	12	20
4	08	16
5	06	14
6	06	14
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC303	Course Title: Metrology & Quality Control (Theory)
Semester: 3rd	Credits: 03
Hours Per Week : 3 (L: 3, T: 0, P:0)	

COURSE OBJECTIVE:

The main objective of this course is to study the advances in technology, measurement techniques, and types of instrumentation devices, principles of instrumentation, transducers & measurement of nonelectrical parameters. The purpose is to provide accurate and reliable measurements for engineering systems.

COURSE CONTENTS**1. Introduction**

- 1.1** Definition of metrology
- 1.2** Standard of measurement
- 1.3** Types of Errors - Controllable and random errors
- 1.4** Precision, accuracy, sensitivity, hysteresis, response time, repeatability, calibration, uncertainty of measurement, interchangeability.
- 1.5** Standardization and standardizing organizations

2. Linear and Angular Measurement

- 2.1** Construction features and use of instruments for non-precision linear measurement: steel rule, calipers, surface plate, angle plate, V-block.
- 2.2** Construction features and use of instruments for precision measurements: vernier calipers, vernier height, and depth gauges, micrometers.
- 2.3** Slip gauges, Indian standards of slip gauges, sets of slip gauges, and use of slip gauges.
- 2.4** Cylinder bore gauges, feeler and wire gauges. Checking flatness, roundness and squareness
- 2.5** Comparators – Characteristics, uses, and working principles of different types of comparators: mechanical, electrical, electronics and pneumatic.
- 2.6** Construction and use of instruments for angular measurements: bevel protector, sine bar, angle gauges, clinometer, angle dekker. Optical instruments for angular measurement, auto collimator.

3. Measurement of Surface Finish

- 3.1** Terminology of surface roughness
- 3.2** Concept of primary texture and secondary texture.
- 3.3** Factors affecting the surface finish.
- 3.3** CLA, RMS, and RA value.
- 3.4** Principle and operation of stylus probe instruments. Tomlinson surface meter and Taylor surface talysurf.

4. Measurements of Screw threads and Gauges

- 4.1** Measurement of screw threads- Introduction, measurements of external and corediameters, checking of pitch and angle of threads with gauges.
- 4.2** Measurements of gears (spur) – Measurement of tooth thickness, pitch
- 4.3** Profile projector, Coordinate Measuring Machine (CMM), Tool maker's microscope.

5. Instrumentation

5.1 Various types of instruments used for mechanical quantities such as displacement, velocity, acceleration, speed and torque. Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers.

5.2 Strain gauge – use of strain gauge and load cells.

6. Quality Control

6.1 Quality control, SQC, function of quality control, quality cost, factors affecting quality of product.

6.2 Inspection need, types of inspection and stages of inspection

6.3 Statistical Quality Control – Definition

6.4 Process Capability

6.5 Introduction to Control Charts (\bar{X} , R, P, C) and their simple applications

6.6 Concepts of ISO 9000, ISO 14000

6.7 Total Quality Management - QC tools, Kaizen, 5S,

COURSE OUTCOME

After the completion of the course, the student will be able to:

- Define accuracy, precision, calibration, sensitivity, repeatability, and such relevant terms in metrology.
- Distinguish between various types of errors in measurement.
- Understand the principle of operation of an instrument and select suitable measuring devices for a particular application.
- Understand the concept of calibration of an instrument.
- Analyze and interpret the data obtained from the different measurement processes and present it in a graphical form, or statistical form.

RECOMMENDED BOOKS

1. Engineering Metrology by RK Jain; Khanna Publishers, New Delhi.
2. A Text Book of Production Engineering by RC Sharma; S Chand and Company, New Delhi.
3. Metrology Laboratory Manual by M Adithan and R Bahl; NITTTR, Chandigarh.
4. Engineering Metrology by RK Rajput; SK Kataria and Sons, Ludhiana
5. Engineering Metrology by Raghvendra and Krishna Murthy; Oxford Publication
6. Engineering Metrology by IC Gupta; Dhanpat Rai Publication
7. Principle of Engineering Metrology by Rega Rajindra; Jaico Publication House

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	09
2.	14	28
3.	04	09
4.	06	13
5.	06	13
6.	14	28
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PRAGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC304	Course Title: PRODUCT DESIGN AND DEVELOPMENT
Semester: 3RD	Credits: 3
Hours Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

To acquire the basic concepts of product design and development process, to understand the engineering and scientific process in executing a design from concept to finished product, to study the key reasons for design or redesign.

COURSE CONTENT

- 1. Introduction :** Introduction to the product, Product life-cycle, Product policy of an organization. Selection of a profitable product, Product design process, Product analysis.
- 2. Value Engineering:** Value engineering in product design; Advantages, Applications in product design, Problem identification, and selection, Analysis of functions, Anatomy of function. Primary versus secondary versus tertiary/unnecessary functions, Functional analysis: Functional Analysis System Technique (FAST), Case studies.
- 3. Product Design:** Introduction to product design tools, QFD, Computer Aided Design, Robust design, DFX, DFM, DFA, Ergonomics in product design,.
- 4. Design for Manufacturing and Assembly:** DFMA guidelines, Product design for manual assembly, Design guidelines for metallic and non-metallic products to be manufactured by different processes such as casting, machining, injection molding etc., Rapid prototyping, needs, advantages, working principle of SLA, LOM and SLS.

COURSE OUTCOME

After the completion of the course, the student will be able to:

- Understand the basic concepts of product design and development process.
- Illustrate the methods to define the customer needs.
- Describe an engineering design and development process.
- Understand the intuitive and advanced methods used to develop and evaluate a concept.

RECOMMENDED BOOK

1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford : New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.
7. Product Design and Value engineering by Dr. M.A Bulsara and Dr. H.R.Thakkar, Charoter Publication.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	6	12
2	15	32
3	12	24
4	15	32
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PRAGRAMME IN MECHANICAL ENGINEERING	
Course Code: ES301	Course Title: Basics of Electrical and Civil Engg
Semester: 3rd	Credits: 3
Hours Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE CONTENT

The main objective of this course is to make candidate familiarize with basic concepts of Electrical and Civil Engineering and make them ready for industry to work in coherent manner.

COURSE CONTENT

SECTION A : CIVIL ENGINEERING

1. Construction Materials:

- 1.1** Properties and uses of various construction materials such as stones, bricks, lime, content and timber with their properties,
- 1.2** Physical/field testing, elements of brick masonry.

2. Foundations

- 2.1** Bearing capacity of soil and its importance
- 2.2** Types of various foundations and their salient features, suitability of various foundations for heavy, light and vibrating machines.

3. Concrete

- 3.1** Various ingredients of concrete, different grades of concrete, water cement ratio, workability,
- 3.2** Physical/field testing of concrete, mixing of concrete, placing and curing of concrete.

4. RCC

- 4.1** Basics of reinforced cement concrete and its use (elementary knowledge),
- 4.2** Introduction to various structural elements of a building.

SECTION B: ELECTRICAL ENGINEERING

5. Overview of DC Circuits

- 5.1** Definition of basic terms, such as current, EMF, Potential Difference (PD); Ohm's Law and its limitations;
- 5.2** Factors affecting resistors and capacitors: - simple problems on series and parallel combinations of resistors with their wattage considerations.
- 5.3** Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits. Star – Delta connections and their conversion.

6. Voltage and Current Sources

- 6.1** Concept of voltage source,
- 6.2** Concept of current sources.

7. Electro Magnetic Induction

- 7.1** Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
- 7.2** Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.

8. Batteries

- 8.1** Basic idea of primary and secondary cells
- 8.2** Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
- 8.3** Charging methods used for lead-acid battery (accumulator)
- 8.4** Care and maintenance of lead-acid battery
- 8.5** Series and parallel connections of cells
- 8.6** General idea of solar cells, solar panels and their applications
- 8.7** Introduction to maintenance free batteries

9. AC Fundamentals

- 9.1** Concept of alternating quantities
- 9.2** Difference between ac and dc
- 9.3** Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.

10. Various Types of Power Plants

- 10.1** Brief explanation of principle of power generation practices in thermal, hydro and nuclear power stations and their comparative study.
- 10.2** A Visit to a nearby Power Station(s) may be organized for better understanding and exposure.

COURSE OUTCOME

After the completion of the course, the student will be able to:

- Understand the basic concepts of electrical and civil engineering.
- Describe various constructions material and their application
- Describe various types of power generation practices
- Explain the DC and AC fundamentals

RECOMMENDED BOOK:

- 1.** A Textbook of Electrical Engineering by B.L Theraja, S. Chand Publication
- 2.** Basic Civil Engineering by S.S Bhavikatti; New Age Publication
- 3.** Basic Electrical Engineering by VN Mittle by TMH

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	3	8
2	3	8
3	4	10
4	4	10
5	8	15
6	2	4
7	8	15
8	6	10
9	6	10
10	4	10
Total	48	100

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC 305	Course Title: Manufacturing Technology-II (Theory)
Semester: 3RD	Credits: 03
Hours Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The main objective is to understand the importance of cutting fluids & lubricants in machining. To study various types of basic production processes and to select, operate and control the appropriate processes for specific applications and to know the functions of Jigs, fixtures and applications of jig-boring machines

COURSE CONTENT**1. Cutting Tools, Cutting Materials & Cutting Fluids**

- 1.1** Cutting Tools - Various types of single-pointing tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect
- 1.2** Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.
- 1.3** Cutting Fluid and Lubricant, their types and selection of cutting fluid for different materials

2. Lathe

- 2.1** Description and function of various parts of a lathe
- 2.2** Classification and specification of various types of lathe
- 2.3** Drives and transmission
- 2.4** Work holding devices
- 2.5** Lathe tools: Parameters/Nomenclature and applications
- 2.6** Lathe operations:- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.
- 2.7** Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.
- 2.8** Speed ratio, preferred numbers of speed selection.
- 2.9** Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.

3. Drilling

- 3.1** Principle of drilling.
- 3.2** Classification of drilling machines and their description.
- 3.3** Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.
- 3.4** Speeds and feeds during drilling, impact of these parameters on drilling, machining time.
- 3.5** Types of drills and their features, nomenclature of a drill.
- 3.6** Drill holding devices.
- 3.7** Types of reamers.

4. Boring

- 4.1** Principle of boring
- 4.2** Classification of boring machines and their brief description.
- 4.3** Specification of boring machines.
- 4.4** Boring tools, boring bars and boring heads.
- 4.5** Description of jig boring machine.

5. Shaping, Planing and Slotting

- 5.1** Working principle of shaper, planer and slotter.
- 5.2** Type of shapers
- 5.3** Type of planers
- 5.4** Quick return mechanism applied to shaper, slotter and planer machine.
- 5.5** Work holding devices used on shaper, planer and slotter.
- 5.6** Types of tools used and their geometry.
- 5.7** Specification of shaper, planer and slotting machine.
- 5.8** Speeds and feeds in above processes.

6. Broaching

- 6.1** Introduction
- 6.2** Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down.
- 6.2** Elements of broach tool, broach tooth details – nomenclature, types, and tool material.

7. Jigs and Fixtures

- 7.1** Importance and use of jigs and fixture
- 7.2** Principle of location
- 7.3** Locating devices
- 7.4** Clamping devices
- 7.5** Types of Jigs – Drilling jigs, bushes, template jigs, plate jig, channel jig, leaf jig.
- 7.6** Fixture for milling, turning, welding, grinding.
- 7.7** Advantages of jigs and fixtures

COURSE OUTCOME:

At the Completion of the course, the student will be able to:

- Know and identify basic manufacturing processes for manufacturing different components.
- Operate & control different machines and equipments.
- Produce jobs as per specified dimensions and inspect the job for specified dimensions.
- Adopt safety practices while working on various machines.

RECOMMENDED BOOKS:

- 1.** Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
- 2.** Manufacturing Technology by M. Adithan and A.B. Gupta; New Age International (P) Ltd, Delhi.
- 3.** Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
- 4.** A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
- 5.** Manufacturing Technology-II by PN Rao
- 6.** Workshop Technology By O.P Khanna
- 7.** Production Engg by R. K Jain

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	10
2.	10	22
3.	06	14
4.	06	10
5.	08	16
6.	06	12
7.	08	16
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC 306	Course Title: Thermal Engineering –I Lab
Semester: 3RD	Credits: 01
Hours Per Week : 2 (L: 0, T: 0, P:2)	

COURSE OBJECTIVE:

The main objective of this course is to make students familiar with different methods of temperature measurements, to understand the construction and working of boilers, compressors and determine the dryness fraction of steam and understand the different modes of heat transfer.

LIST OF PRACTICALS

1. Determination of temperature by
 - 1.1 Thermocouple
 - 1.2 Pyrometer
 - 1.3 Infrared thermometer
2. Demonstration of mountings and accessories on a boiler.
3. Study of boilers (through industrial visit)
4. Study of air compressors.
5. Demonstration of heat transfer through conduction, convection and Radiation
6. Determine the dryness fraction of steam

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC 307	Course Title: STRENGTH OF MATERIALS(PRACTICAL)
Semester: 3RD	Credits: 01
Hours Per Week : 2 (L: 0, T: 0, P:2)	

COURSE OBJECTIVE:

The main objective of this course is to quantify and understand whether a material or product is suitable for certain applications by performing various tests.

LIST OF PRACTICALS

1. Tensile and compressive test on bars of Mild steel and Aluminium..
2. Bending test on a steel bar or a wooden beam.
3. Impact test on metals
 - Izod test
 - Charpy test
4. To determine the stiffness of a helical spring and to put a graph between load and extension.
5. Hardness test on different metals. Using Rockwell, Brinell and ricker's testing machine.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: MEPC308	Course Title: Metrology & Quality Control Lab
Semester: 3RD	Credits: 01
Hours Per Week : 2 (L: 0, T: 0, P:2)	

COURSE OBJECTIVE:

The objective of this course is to understand techniques for precise measurement of the dimensions of various objects and shapes

LIST OF PRACTICALS

1. Internal and external measurements with vernier calliper and microscope
2. Measurement of linear dimensions with height gauge and depth gauge.
3. Measurement of flatness, concentricity with dial indicator
4. Use of feeler gauge, wire gauge, radius gauge and fillet gauges for checking of standard parameters.
5. Use of plain plug and ring gauge, taper plug and ring gauge, thread plug and ring gauge and snap gauges.
6. Measurement of Angle using; i) Cylindrical rollers and spherical balls and slip gauges
ii) Bevel protector iii) Sine Bar/Sine Table , Slip Gauges, Height Gauge and dial indicator.
7. Measurement of thread parameters by using tool maker's microscope.
8. Measurement of effective diameter of external threads by 2-wire and 3-wire method.
9. Measurement of cylindrical bore using cylinder bore gauge for bore diameter, ovality and taper.
10. Measurement of worn out IC engine piston clearance between cylinder and piston.
11. Measurement of co-ordinates of two or more than two holes using surface plate, angle plate, Height Gauge, dial indicator and slip gauges.
12. Measurement of a profile using profile projector.
13. Study and use of Auto-Collimator

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANIC ENGINEERING	
Course Code: MEPC309	Course Title: Manufacturing Technology-II Lab
Semester: 3rd	Credits: 01
Hours Per Week : 2 (L: 0, T: 0, P:2)	

COURSE OBJECTIVE:

The main objective of this course is to Practice the operation on Lathe machine, to know the working of Drilling machine, shaper, and grinder and be in a position to operate the same, to make use of various measuring instruments for taking dimensions.

LIST OF PRACTICALS**2. Turning Shop**

- JOB1. Grinding of single point turning tool.
- JOB2. Exercise of simple turning and step turning.
- Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.

3. Advance Fitting Shop

- JOB1. Exercise on drilling, reaming, counter boring, counter sinking and tapping
- Job 2. Dove tail fitting in mild steel
- JOB3. Radius fitting in mild steel
- Job 4. Pipe threading with die

4. Machine Shop

- Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine
- Job 2. Exercise on key way cutting and spline cutting on shaper machine

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: AU301	Course Title: Indian Constitution (Theory)
Semester: 3RD	Credits: 00
Hours Per Week: 2 (L: 2, T: 0, P: 0)	

COURSE CONTENT

1. The Constitution :

- 1.1** Introduction
- 1.2** The History of the Making of the Indian Constitution
- 1.3** Preamble and the Basic Structure, and its interpretation
- 1.4** Fundamental Rights and Duties and their interpretation
- 1.5** State Policy Principles

2. Union Government

- 2.1** Structure of the Indian Union
- 2.2** President – Role and Power
- 2.3** Prime Minister and Council of Ministers
- 2.4** Lok Sabha and Rajya Sabha

3. State Government

- 3.1** Governor – Role and Power
- 3.2** Chief Minister and Council of Ministers
- 3.3** State Secretariat

4. Local Administration

- 4.1** District Administration
- 4.2** Municipal Corporation
- 4.3** Zila Panchayat

5. Election Commission

- 5.1** Role and Functioning
- 5.2** Chief Election Commissioner
- 5.3** State Election Commission

RECOMMENDED BOOKS

- 1.** Ethics and Politics of the Indian Constitution by Rajeev Bhargava published by Oxford University Press, New Delhi, 2008
- 2.** The Constitution of India by B.L. Fadia Sahitya Bhawan; New edition (2017)
- 3.** Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition.

COURSE OUTCOME

After the completion of the course, the student will be able to:

- Explain the philosophy, design, structure and historical background of the constitution.
- Demonstrate the Indian values, ideals and role of the constitution in a democracy.
- Identify individual role and ethical responsibility towards society.