

TILAK MAHARASHTRA VIDYAPEETH, PUNE																
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA COURSE																
COURSE NAME : MECHANICAL ENGINEERING																
COURSE CODE : ME																
DURATION OF COURSE : 6 SEMESTERS																
SEMESTER :FIFTH													DURATION:- 16 WEEKS			
FULL TIME																
SR. NO	SUBJECT TITLE	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME											
			TH	PR	PAPER HRS	TH		INT	TOTAL		PR		OR		TW	
						Max	Min		Max	Min	Max	Min	Max	Min		
1	Advanced Manufacturing Processes	ME5001	03	02	03	80	32	20	100	40	25*	10	--	--	--	--
2	Power Engineering	ME5002	04	02	03	80	32	20	100	40	25*	10	25**	10	--	--
3	Measurements & Control	ME5003	03	02	03	80	32	20	100	40	25*	10	--	--	--	--
4	Metrology & Quality Control	ME5004	04	02	03	80	32	20	100	40	25*	10	25**	10	--	--
5	<b>Elective I (Select any one)</b>															
	Tool Engineering	ME5005	03	02	03	80	32	20	100	40	--	--	--	--	25*	10
	Power Plant Engineering	ME5006	03	02	03	80	32	20	100	40	--	--	--	--	25*	10
	Mechatronics	ME5007	03	02	03	80	32	20	100	40	--	--	--	--	25*	10
6	Principles of Management	ME5008	04	--	--	80	32	20	100	40	--	--	--	--	--	--
7	Development of Generic Skills- II	ME5011	01	--	--	40	16	10	50	20	--	--	--	--	--	--
8	Professional Practices IV	ME5009	--	02***	--	--	--	--	--	--	--	--	--	--	50*	20
<b>TOTAL</b>			<b>22</b>	<b>12</b>	<b>--</b>	<b>520</b>	<b>--</b>	<b>130</b>	<b>650</b>	<b>--</b>	<b>100</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>75</b>	<b>--</b>
STUDENT CONTACT HOURS PER WEEK(FORMAL TEACHING) : <b>34 HRS</b> ; Theory and Practical periods of 60 minutes each																
* INTERNAL ASSESSMENT , ** EXTERNAL ASSESSMENT , *** TUTORIAL																
<b>TOTAL MARKS – 875</b>																
ABBREVIATIONS : TH – THEORY , INT-INTERNAL , PR – PRACTICALS , OR –ORAL, TW – TERMWORK																
All Practical, orals and Term Work assessments are to be done as per the prevailing norms for implementation and assessment																

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**

**COURSE CODE : ME**

**SEMESTER : FIFTH**

**SUBJECT TITLE : ADVANCED MANUFACTURING  
PROCESSES**

**SUBJECT CODE : ME5001**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
03	02	03	80	20	25*	---	--	125

**Pre-requisites:** The student must know the following concepts:

1. Conventional manufacturing processes.
2. Engineering materials.

**Objectives:** The student will be able to

1. Know different nontraditional machining processes, CNC milling machines.
2. Understand the working of special purpose machines.
3. Work as maintenance engineer.
4. Know the operation and control of different advanced machine tools and equipments.
5. Produce jobs as per specified requirements by selecting the specific machining process.
6. Adopt safety practices while working on various machines.

## Contents: Theory

Unit	Name of The Topic	Hours	Marks
01	<b>NON-TRADITIONAL MACHINING PROCESSES</b> <b>ELECTRICAL DISCHARGE MACHINING.</b> Operating Principle, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, Applications	06	26
	<b>Wire cut EDM:</b> Operating Principle, Setup of WEDM, controlling parameters, applications. <b>Laser Beam Machining.</b> Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM. Characteristics, controlling parameters, applications, Application Of Laser Beam for Welding (LBW)	04	
	<b>Other non-traditional machines such as ECM (Electrochemical Machining)</b> Principle of working, applications. Water jet machining	05	
02	<b>CNC MILLING MACHINES</b> Vertical and horizontal machining center: Constructional features, axes identification, Electronic control system. Automatic tool changer and tool magazine. CNC programming: Preparatory functions (G-code), miscellaneous functions (M-code), Part programming including subroutines and canned cycles. Principles of computer aided part programming.	12	20
03	<b>MACHINE TOOL AUTOMATION:</b> Introduction and Need. (A) Single spindle automates, transfer lines.	05	08
	(B) Elements of control system, Limit switches, Proximity switches, Block diagram for feedback and servo control system, Introduction to PLC, Block diagram of PLC.	05	10

<b>04</b>	<b>SPECIAL PURPOSE MACHINES (SPM)</b> Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.	<b>04</b>	<b>06</b>
<b>05</b>	<b>MAINTENANCE OF MACHINE TOOLS</b> Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).	<b>07</b>	<b>10</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Practical:**

**Skills to be developed:**

**Intellectual skills:**

1. To select an appropriate non-conventional machining process for required component.
2. To write programs for CNC milling machine.
3. To specify the requirement for special purpose machines and automation.
4. To select the maintenance procedure for given machine tool.

**Motor Skills:**

1. To execute part programs on CNC milling machine / machining center.
2. To repair and maintain machine tools and sub systems.
3. To use and operate different hand tools required for repair and maintenance.
4. To identify and rectify the faults in the given sub assembly.

**Notes:**

1. The workshop instructors should prepare specimen job in each shop as demonstration
2. practice before the student (as per the drawing given by subject teacher / workshop superintendent)
3. Theory behind practical is to be covered by the concerned subject teacher / workshop superintendent.
4. Workshop diary should be maintained by each student duly signed by respective shop instructors.

**List of Practical:**

1. Two jobs on CNC milling having following operations - face milling, slotting, Contour machining. (Group of two students, each group must use different program for different job dimensions)
2. One assignment on part programming on machining center.
3. One assignment on machine tool installation procedure.
4. Industrial visit to observe automats and report on the tools, fixtures and cams used on automats.
5. Industrial visit to observe at least one non-traditional machining process and report on visit.
6. Dismantling and Assembly of any one: (a) Tailstock on lathe (b) Apron Mechanism. (c) Tapping attachment on drilling machine. (d) Lathe Chuck
7. Report on mounting and dismounting procedure of following (any two)  
a) Milling machine arbor. b) Vertical milling head. c) Tool post
8. One assignment on USM, CHM, EBM, AJM, WJM, PAM.

**Recommended Books:**

Sr. No.	Title	Author	Publisher
01	Manufacturing Science	Amitabh Ghosh, Mullik	East-West Press Pvt. Ltd.
02	Production Technology	HMT, Bangalore	Tata McGraw Hill
03	CNC Machines	Pabla B. S. M. Adithan	New Age International Limited.
04	Industrial Maintenance	H.P.Garg	S. Chand & Co. Ltd.
05	Non-Conventional Machining	P. K. Mistra	Narvasa Publishing
06	Maintenance Engg. Handbook	Lindley R. Higgins	House McGraw Hill
07	Manufacturing Processes	Begman, Amsted	John Willey and Sons.
08	Fundamental of Metal Cutting and Machine Tools	B. L. Juneja	New Age International Limited.
09	Technology of Machine Tools.	Steve Krar, Albert Check	McGraw-Hill International.
10	CAD/CAM Principals And Applications	P. N. Rao	Tata McGraw-Hill
11	Manufacturing Technology Metal Cutting & Machine Tools	P. N. Rao	Tata McGraw-Hill

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**

**COURSE CODE : ME**

**SEMESTER : FIFTH**

**SUBJECT TITLE : POWER ENGINEERING**

**SUBJECT CODE : ME5002**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
04	02	03	80	20	25*	25*	--	175

**Pre-requisites:** The student must know the following concepts:

1. Engine parts and their function.
2. Basic thermodynamic processes.

**Objectives:** The student will be able to

1. Apply continuity equation to nozzles.
2. Describe construction and working of various types of steam turbines.
3. Explain use of different types of steam condensers and compare various steam condensers.
4. Describe internal combustion engine.
5. Calculate various performance characteristics of IC Engines by conducting trial.
6. Understand working of gas turbines and its application.
7. Select appropriate type of compressor to suit the requirements.
8. Calculate performance parameters of Air compressor.
9. Understand Refrigeration & Air-conditioning processes and their application.

## Contents: Theory

Unit	Name of the Topic	Hours	Marks
01	<b>I.C. ENGINE</b> Power Cycles - Carnot, Otto, Diesel, Dual, Brayton Cycle, representation on P-V, T-S diagram and simple numerical Otto cycle only. Classification of I.C. Engines Two stroke and four stroke Engines Construction and working, comparison, valve timing diagram. Brief description of I.C. Engine combustion (SI & CI), scavenging, pre-ignition, detonation, supercharging, turbo charging, simple Carburetor, M.P.F.I.(Multi point fuel injection), fuel injection pump List of fuels, lubricant additives and their advantages.	12	20
02	<b>I.C. ENGINE TESTING AND POLLUTION CONTROL</b> Engine Testing - I.P. (Indicated Power), B.P. (Break Power) Mechanical, Thermal, Relative and volumetric efficiency, BSFC (Break specific fuel consumption), Heat Balance sheet. Morse Test, Motoring test Pollution Control Pollutants in exhaust gases of petrol and diesel engines, their effects on environment, exhaust gas analysis for petrol and diesel engines, Catalytic Converter, Bharat stage I, II, III norms.	10	16
03	<b>AIR COMPRESSERS</b> Introduction Uses of compressed air Classification of air compressors Definitions: Compression ratio, Compressor capacity, Free Air Delivered, Swept volume Reciprocating air compressor - Construction and working of single stage and two stage compressor, Efficiency: Volumetric, Isothermal & Mechanical (only simple numerical), Advantages of multi staging. Rotary Compressors - Construction and working of screw, lobe, vane, centrifugal compressors (No numerical) Comparison and applications of reciprocating and rotary compressors Purification of air to remove oil, moisture and dust	10	16

<b>04</b>	<b>GAS TURBINES AND JET PROPULSION</b> Classification and applications of gas turbine. Constant volume and constant pressure gas turbines. Closed cycle and open cycle gas turbines and their comparison. Methods to improve thermal efficiency of gas turbine-Regeneration, inter- cooling. Jet Propulsion Principles of turbojet, turbo propeller, Ram jet. Rocket propulsion Solid propellants and liquid propellants, components of liquid propellants rocket engine.	<b>10</b>	<b>12</b>
<b>05</b>	<b>REFRIGERATION AND AIR- CONDITIONING</b> Introduction COP (Coefficient of performance) of Heat Pump and refrigerator, Tons of Refrigeration. Vapour compression system Vapour compression refrigeration cycle, components of Vapour Compression Cycle. Applications - Water cooler, Domestic refrigerator, Ice plant & cold storage. Psychrometry - Properties of air, psychrometric chart & processes (No Numerical) Air conditioning systems - Definition of Air conditioning and classification of Air Conditioning systems.	<b>12</b>	<b>16</b>
	<b>TOTAL</b>	<b>54</b>	<b>80</b>

**Practical:**

**Skills to be developed:**

**Intellectual Skills:**

1. Identify components of IC Engines.
2. Understand working principals of IC Engines, Compressors and refrigeration systems.
3. Analyze exhaust gases and interpret the results.
4. Use internet for information search.
5. Interpret the test results.
6. Select tools and gauges for inspection and maintenance.

**Motor skills:**

1. Assemble and dismantle engine according to given procedure.
2. Follow the procedure to start an engine.
3. Operate IC Engine test rig, refrigeration test rig for measuring various parameters and plotting them.

- Operate exhaust gas analyzer for measuring pollutants.

**List of Practical:**

- Dismantling assembly of petrol/diesel engine
- Trial on single/multi-cylinder petrol and diesel engine with heat balance sheet
- Morse Test on multi-cylinder Diesel/Petrol engine
- Measurement of I.C. pollutants with the help of Exhaust Gas Analyzer for petrol / diesel engine with the help of Exhaust gas
- Trial on two-stage Reciprocating compressor
- Collection and analysis of manufacturer's catalogue for Reciprocating/Screw compressor
- Visit website- <http://library.think.quest.org>  
<http://www.grc.nasa.gov> and prepare a brief report on gas turbine and jet propulsion.
- Trial on Refrigeration Test Rig for calculation of C.O.P, power required, refrigerating effect.
- Identify the components and trace the flow of refrigerant through various components in window air conditioner.

**Recommended Books:**

Sr. No.	Title	Author	Publisher
01	Course in Thermal Engineering	V. M. Domkundwar	Dhanpat Rai & Co
02	Thermal Engineering	P.L. Ballaney	Khanna Publishers
03	Text Book of Thermal Engineering	R.S. Khurmi	S. Chand & Co. Ltd
04	Heat Engine Vol.-I and Vol.-II	Patel, Karamchandani	Acharya Publication
05	Automobile Engineering	R. k. Jain	Tata McGraw Hill

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**

**COURSE CODE : ME**

**SEMESTER : FIFTH**

**SUBJECT TITLE : MEASUREMENTS AND CONTROL**

**SUBJECT CODE : ME 5003**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
03	02	03	80	20	25*	--	--	125

**Pre-requisites:** The student must know the following concepts:

1. Basic physics i.e. Pressure, temperature, force, flow, stress and strain
2. Measurement system (metric system)

**Objectives:** The student will be able to

1. Understand the principle of operation of an instrument.
2. Appreciate the concept of calibration of an instrument.
3. Select Suitable measuring device for a particular application.
4. Distinguish between various types of errors.

## Contents: Theory

Unit	Name of the Topic	Hours	Marks
01	<p><b>SIGNIFICANCE OF MEASUREMENT</b></p> <p>Classification of instruments, static terms and characteristics- range and span, accuracy and precision, reliability, calibration, hysteresis and dead zone, drift, sensitivity, threshold and resolution, repeatability and reproducibility, linearity. Dynamic characteristics - speed of response, fidelity and dynamic errors, overshoot.</p> <p>Measurement of error- classification of errors, environmental errors, signal transmission errors, observation errors, operational errors.</p>	12	16
02	<p><b>CONTROL SYSTEMS</b></p> <p>Block diagram of automatic control system, closed loop system, open loop system, feedback control system, feed forward control system, servomotor mechanism, comparison of hydraulic, pneumatic, electronic control systems, proportional control action. Applications of measurements and control for setup for boilers, air conditioners, motor speed control.</p>	08	14
03	<p><b>DISPLACEMENT MEASUREMENT</b></p> <p>Potentiometer, LVDT (Linear Variable Differential Transducer), Eddy current generation type, tachometer, incremental and absolute type.</p> <p>Speed measurement - Mechanical Tachometers, Revolution counter &amp; timer, Slipping Clutch Tachometer, Electrical Tachometers, Eddy current Drag Cup Tachometer, Magnetic and photoelectric pulse counting methods, Contactless Electrical tachometer,</p> <p>Inductive Pick Up, Capacitive Pick Up, Stroboscope</p>	08	14
04	<p><b>TEMPERATURE MEASUREMENTS</b></p> <p>Non-electrical methods - bimetal and liquid in glass thermometer, pressure thermometer</p> <p>Electrical methods – RTD (Resistance temperature detectors), platinum resistance thermometer, thermistor</p> <p>Thermoelectric methods - elements of thermocouple, law of intermediate temperature, law of intermediate metals, thermo EMF measurement.</p> <p>Quartz thermometer, Pyrometers - radiation and optical</p>	06	12

<b>05</b>	<b>FLOW MEASUREMENTS</b> Variable head flow meters, variable area meter, rotameter, turbine meter, anemometer- hot wire and hot film, electromagnetic flow meter, ultrasonic flow meter. <b>Strain Measurement</b> Stress-strain relation, types of strain gauges, strain gauge materials, resistance strain gauge - bonded and unbounded, types (foil, semiconductor, wire wound gauges), selection and installation of strain gauges load cells, rosettes	<b>07</b>	<b>12</b>
<b>06</b>	<b>MISCELLANEOUS MEASUREMENT</b> Acoustics measurement - sound characteristics, intensity, frequency, pressure, power - sound level meter, piezoelectric crystal type. Humidity measurement - hair hygrometer, Humistor hygrometer Liquid level measurement - direct and indirect methods Force measurement -Tool Dynamometer (Mechanical Type) Shaft Power Measurement - Eddy Current Dynamometer, Strain Gauge Transmission Dynamometer.	<b>07</b>	<b>12</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Practical:**

**Skills to be developed:**

**Intellectual skills:**

1. Analyze the result of calibration of thermister.
2. Interpret calibration curve of a Rotameter.
3. Evaluate the stress induces in a strain gauge.
4. Verify the characteristics of photo transistor and photo diode.

**Motor skills:**

1. Test and calibration of a thermocouple.
2. Handle various instruments.
3. Draw the calibration curves of rotameter and thermister.
4. Measure various parameters using instruments.

**List of Practical:**

1. Measurement of strain by using a basic strain gauge and hence verify the stress induced.
2. Speed Measurement by using Stroboscope / Magnetic / Inductive Pick Up.
3. Measurement of flow by using rotameter.
4. Displacement measurement by inductive transducer.

5. Temperature control using Thermal Reed switch & Bimetal switch.
6. Temperature calibration by using thermocouple.
7. Determination of negative temperature coefficient and calibration of a thermister.
8. Measurement of force & weight by using a load cell.
9. Liquid Level Measurement by using Capacitive Transducer system.
10. Verify characteristics of photo transducer & photo diode.

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Mechanical Measurements & Instrumentation	A.K. Sawhney	Dhanpat Rai & Sons, New Delhi.
02	Mechanical Measurement & Control	R.V. Jalgaonkar	Everest Publishing House, Pune
03	Mechanical Measurements & Control	D.S.Kumar	Metropolitan Publications, New Delhi
04	Instrumentation Devices & Systems	C.S. Narang	Tata McGraw Hill Publications
05	Mechanical & Industrial Measurements	R.K.Jain	Khanna Publications, New Delhi
06	Instrumentation, Measurement and Analysis	B.C. Nakra and K.K. Chaudhry	Tata Mc Graw Hill Publication

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**  
**COURSE CODE : ME**  
**SEMESTER : FIFTH**  
**SUBJECT TITLE : METROLOGY & QUALITY CONTROL**  
**SUBJECT CODE : ME5004**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
04	02	03	80	20	25*	25*	--	175

**Pre-requisites:** The student must know the following concepts:

1. Metric system.
2. Measuring instruments like vernier Calipers, Micrometer.

**Objectives:** The student will be able to

1. Define accuracy, precision, calibration, sensitivity, repeatability and such relevant terms in metrology.
2. Select appropriate instrument/s for specific measurement.
3. Analyze and interpret data obtained from different measurements processes and present it in the graphical and statistical form.
4. Construct and draw control charts.
5. Understand ISO certification procedure and quality system.

## Contents: Theory

Unit	Name of the Topic	Hours	Marks
01	<b>INTRODUCTION TO METROLOGY</b>	03	04
	<b>METROLOGY BASICS</b> Definition of metrology, Categories of metrology, Scientific metrology, Industrial metrology, Legal Metrology, Need of inspection, Precision, Accuracy, Sensitivity, Readability, Calibration, Traceability, Reproducibility, Sources of errors, Factors affecting accuracy, Selection of instruments, Precautions while using instruments for getting higher precision and accuracy.		
	<b>Standards and Comparators</b> Definition and introduction to line standard, end standard, Wavelength standard, slip gauge and its accessories, length bars. Definition, Requirement of good comparator, Classification, use of comparators, Working principle of comparators, Dial indicator, Sigma comparator, Pneumatic comparator, Electrical & Electronic comparators, Relative advantages and disadvantages.	05	08
	<b>Limits, Fits, Tolerances and Gauges</b> Concept of Limits Fits and Tolerances, Selective Assembly, Interchangeability, Hole and Shaft Basis System, Design of Plug, Ring Gauges.	04	06
	<b>Angular Measurement</b> Concept, Instruments for Angular, Measurements, Working and use of Universal Bevel Protractor, Sine Bar, Spirit Level, Principle of Working of Clinometers, Angle Gauges (with numerical on setting of angle gauges).	03	04
02	<b>THREADS AND GEAR METROLOGY</b>	01	04
	<b>Screw thread Measurements</b> ISO grade and fits of thread, Errors in threads, pitch errors, measurement of different elements such as major diameter, minor diameter, effective diameter, pitch, Two wire method, Thread gauge micrometer, working principle of floating carriage dial micrometer.		
	<b>Gear Measurement and Testing</b> Analytical and functional inspection, Rolling test, Measurement of tooth thickness (constant chord method), gear tooth Vernier, errors in gears such as backlash, runout, composite.	03	04



**Practical:****Skill to be developed:****Intellectual Skills:**

1. To understand principle, working of various measuring instruments.
2. Selection of proper instruments for measurement.
3. Calculation of least count of instrument.
4. Take reading using the instrument
5. Interpret the observation and results
6. Collection and recording of data
7. Analysis of data.

**Motor Skills:**

1. Setting the instruments for zero error adjustment.
2. Proper alignment of the instrument with work piece
3. Handling of instruments
4. Care and maintenance of instruments.
5. Measure the dimensions form the instruments.
6. Calibration and traceability of the instruments
7. Graphical representation of data.

**Notes:**

1. The practical shall be conducted by the subject teacher, by taking actual measurements of different parameters on the jobs prepared by earlier batches in workshop practice or actual measurement of component dimension.
2. The data collected from the practical of basic measuring instruments may be used for experiments of SQC.
3. During practical examination student should measure at least five parameters by using two to three different measuring instruments and evaluation of practical be done considering
  - a) Selection of appropriate measuring instrument by the examinee.
  - b) Computation of least count of instrument used.
  - c) Correctness of measurements of the measured.

**List of Practical:**

1. Standard use of basic measuring instruments. Surface plate, v-block, spirit level, combination set, filler gauge, screw pitch gauge, radius gauge, Vernier caliper, micrometer and slip gauges to measure dimension of given jobs.
2. To find unknown angle of component using sine bar and slip gauges.
3. Study and use of optical flat for flatness testing.
4. Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge.
5. Study and use of dial indicator as a mechanical comparator for run out measurement, roundness comparison.
6. Measurement of gear tooth elements by using gear tooth Vernier caliper and span micrometer, verification of gear tooth profile using profile projector
7. Testing of machine / machine tool for flatness, parallelism, perpendicularity by autocollimator.
8. Draw the frequency histogram, frequency polygon and ogive for given samples (min 50 readings) and find mean, mode, median.
9. To draw the normal distribution curve and find standard deviation, variance, range
10. To draw and interpret the control limit for variable measurement (X and R chart).

**Recommended Books:**

Sr. No.	Title	Author	Publisher
01	Engineering Metrology	R. K. Jain	Khanna Publisher, Delhi.
02	Metrology for Engineers	J.F.W. Galyer and C. R. Shotbolt	ELBS
03	Engineering Metrology	K. J. Hume	Kalyani publishers
04	A Text Book of Engineering Metrology	I.C. Gupta	Dhanpat Rai and Sons,
05	Metrology Lab. Manual	M. Adithan and R. Bahn	T.T.T.I. Chandigarh.
06	Statistical Quality Control	M. Mahajan	Dhanpat Rai and Sons ,
07	Quality Control	T.T.T.I. Chennai	Tata McGraw Hill,
08	Quality Planning and	Juran U.M. and	Tata McGraw Hill,

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
	Analysis	Gryna	
09	Inspection and Quality Control	National productivity council	N.P.C., New Delhi.
10	Managing for Total Quality	N. Logothetis	Prentice-Hall, Delhi.
11	Statistical Process Analysis	Lauth Alwan	Tata McGraw Hill.

## **2. IS/ International Codes:**

IS 919 - 1993 Recommendation for limits, fits and tolerances

IS 2029 - 1962 Dial gauges

IS 2103 - 1972 Engineering Square

IS 2909 - 1964 Guide for selection of fits

IS 2921 - 1964 Vernier height gauges

IS 2949 - 1964 V Block.

IS 2984 - 1966 Slip gauges

IS 3139 - 1966 Dimensions for screw threads.

IS 3179 - 1965 Feeler gauges.

IS 3455 - 1966 Tolerances for plain limit gauges.

IS 3477 - 1973 Snap gauges.

IS 6137 - 1971 Plain plug gauges.

IS 3651 - 1976 Vernier Caliper

IS 4218 - Isometric screw threads

IS 4440 - 1967 Slip gauges accessories

IS 5359 - 1969 Sine bars

IS 5402 - 1970 Principle and applications of sine bars

IS 5939 - 1970 Sine angles, sine tables.

**COURSE NAME : DIPLOMA IN MECHANIC ENGINEERING**  
**COURSE CODE : ME**  
**SEMESTER : FIFTH**  
**SUBJECT TITLE : TOOL ENGINEERING (ELECTIVE-I)**  
**SUBJECT CODE : ME5005**

**TEACHING & EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
03	02	03	80	20	--	--	25*	125

**Pre-requisites:** The student must know the following concepts:

1. Engineering materials and their properties
2. Heat treatment processes.
3. Manufacturing processes

**Objectives:** The student will be able to

1. Select cutting tools and its material using data book and manufacturer's catalogue.
2. Estimate tool wear and tool life.
3. Use press tools and dies effectively.
4. Design strip layout for given component.
5. Decide appropriate cutting fluid for machining process improvement.

## Contents: Theory

Unit	Name of the Topic	Hours	Marks
<b>01</b>	<p><b>METAL CUTTING</b></p> <p>Mechanics of metal cutting: requirements of tools, cutting forces - types of chips, chip thickness ratio, shear angle - simple numericals, types of metal cutting process - orthogonal, oblique and form cutting.</p> <p>Cutting fluids - types, characteristics and applications.</p> <p>Tool wear, types of wear, tool life - tool life equations.</p> <p>Machinability - Definition, factors affecting machinability, machinability index.</p> <p>Tool materials: Types, characteristics, applications. Heat treatment of tool steels, specification of carbide tips, types of ceramic coatings.</p> <p>Cutting tool geometry: Single point cutting tools, drills, reamers, milling cutters.</p>	<b>14</b>	<b>20</b>
<b>02</b>	<p><b>PRESS TOOLS</b></p> <p><b>Presses:</b> Types, Specifications</p> <p><b>Types of dies and construction:</b> Simple Die, Compound Die, Progressive Die, Combination Die.</p> <p>Punch &amp; die mountings, pilots, strippers, misfeed detectors, Pressure Pads, Knock-outs, stock guide, Feed-Stop, guide bush, guide pins.</p> <p><b>Die Design Fundamentals:</b> Die Operations - piercing, shearing, cropping, notching, lancing, blanking, coining, embossing, stamping, curling, drawing, bending, forming.</p> <p>Die set, Die shoe, Die area, calculation of clearances on die and punch for blanking and piercing dies, strip layout, calculation of material utilization factor.</p> <p><b>Forming Dies:</b> Bending: methods, Bending Dies, bend allowance, spring-back, spanning, bending pressure, pressure pads, development of blank length.</p> <p>Drawing: operations, Metal flow during drawing.</p> <p>Calculation of Drawing blank size, variables affecting metal flow during drawing, single action and double action dies, combination dies.</p>	<p><b>04</b></p> <p><b>07</b></p> <p><b>07</b></p> <p><b>12</b></p>	<p><b>8</b></p> <p><b>14</b></p> <p><b>14</b></p> <p><b>16</b></p>

<b>03</b>	<b>FUNDAMENTALS OF OTHER TOOLS</b> Constructional features of - Pressure Die casting dies, metal extrusion dies, injection moulding dies, forging dies, plastic extrusion dies.	<b>04</b>	<b>8</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Practical:**

**Skill to be developed:**

**Intellectual skills:**

1. To understand & differentiate types of presses & press operation.
2. To understand types of dies & their working principles.
3. To select suitable strip layout for a given work piece.
4. To calculate blank length & blank diameter of a given work piece.
5. To understand tool angles of various cutting tools & their importance.
6. To select suitable punch, pilot & stripper for a given application
7. To calculate cutting force & shear angle.

**Motor Skills:**

1. To draw strip layout & other figures
2. To draw different types of dies.
3. To draw types of cutting tools showing various angles.
4. To design & draw drawing die for a given component.

**List of Practical:**

1. Report on Visit to press shop for study of presses.
2. Sketches of Combination Die, Progressive Die, Compound die, Inverted Die, Drawing Die, Bending Die.
3. Drawing of strip layout of simple component (Different component for every student) and calculation of material utilization factor.
4. Sketches of Injection Moulding die, Pressure die-casting die, forging die.
5. Two assignments on calculation of Cutting forces and shear angle based on Merchant's circle.
6. One assignment each on development of blank length for bending operation and single stroke drawing operation.

7. One assignment on designation of carbide tools.
8. Sketches of different types of cutting tools showing details of tool angles.
9. One assignment on types of Punches and pilots, strippers
10. Design of blanking die - Drawing sheets showing assembly & details.

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Tool Design	Donaldson Anglin	Tata McGraw Hill
02	A text Book of Production Engineering	P. C. Sharma	S Chand & Co.
03	Production Technology	H. M. T.	Tata McGraw Hill
04	Production Technology	R. K. Jain	Khanna Publishers
05	Fundamental of tool design.	A.S.T.M.E.	Prentice-Hall of India.
06	Introduction to Jig and Tool Design	M.H.A. Kempster	Viva publ.
07	Jigs and Fixtures	P. H. Joshi	Tata McGraw Hill
08	Press Tools	P. H. Joshi	Tata McGraw Hill

**NAME : DIPLOMA IN MECHANICAL ENGINEERING**  
**COURSE CODE : ME**  
**SEMESTER : FIFTH**  
**SUBJECT TITLE : POWER PLANT ENGINEERING**  
**(ELECTIVE-I)**  
**SUBJECT CODE : ME5006**

**TEACHING & EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
03	02	03	80	20	--	--	25*	125

**Pre-requisites:** The student must know the following concepts:

1. Heat transfer.
2. Atomic theory

**Objectives:** The student will be able to

1. Become familiar with present and future power scenario of India.
2. Calculate efficiency of power generation cycles.
3. Understand working of high pressure boilers, coal and ash handling systems of power plant.
4. Draw layout, understand the working and compare different power plants.
5. Enlist sources of waste heat and explain method of heat recovery.
6. Explain constructional features of non conventional energy source devices.
7. Appreciate economical and operational aspects of power plants.

**Contents: Theory**

<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>01</b>	<b>INTRODUCTION TO POWER PLANT</b> Power scenario in India Types of power plants - Hydro, Nuclear, Thermal, future trends in power sector. Analysis of steam cycles- Carnot, Rankine, Reheat cycle, Regenerative cycle, methods of reheating, advantages and disadvantages of reheat cycle,	<b>06</b>	<b>10</b>
<b>02</b>	<b>STEAM POWER PLANT</b> Layout of steam power plant, general features of selection of site. High pressure boilers - Construction and working of sub-critical and super-critical boilers. Coal and ash handling system - equipments for in plant handling of coal such as belt conveyor, screw conveyor, bucket elevator, coal crushing, pulverized fuel handling system, ball mill, pulverized fuel and their advantages, multi retort stoker, pulverized fuel burner, hydraulic and pneumatic ash handling, Electrostatic precipitator. Boiler feed water treatment Environmental aspects of steam power plant - water pollution, air pollution, emission standard and its control	<b>10</b>	<b>18</b>
<b>03</b>	<b>NUCLEAR POWER PLANT</b> Fusion and fission reaction, general criteria for selection of site. Elements of nuclear power station, layout, types of nuclear reactors. Nuclear fuels, coolant & moderators. Working of PWR, BWR, CANDU, Breeder type reactor. Safety precautions and waste disposals.	<b>08</b>	<b>18</b>
<b>04</b>	<b>GAS TURBINE POWER PLANT</b> General Layout, Gas turbine cycle, selection of site, Gas turbine power plants in India. Components of gas turbine plants, gas turbine Fuels. Comparison of gas turbine plant with diesel and steam power plant.	<b>08</b>	<b>12</b>

<b>05</b>	<b>NON CONVENTIONAL POWER GENERATION PLANTS</b> Geothermal power plant- types, economical justification Tidal power plant- factors affecting suitability of site, working of different tidal power plants, advantages and disadvantages Wind power plant- different types, advantages and disadvantages. Solar power plant Small hydro power plant Introduction to Plasma technology	<b>08</b>	<b>10</b>
<b>06</b>	<b>ECONOMICS AND OPERATIONAL ASPECTS</b> Prediction of load, selection of types of generation, number of generating units. Load duration curves, cost analysis, elements, controlling the cost of power plant (simple numerical) Major electrical equipments in power station - generator, step- up transformer, switch gear, electrical motors	<b>08</b>	<b>12</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Practical:**

**Skills to be developed:**

**Intellectual skills:**

1. Understand working of various power plants
2. Understand constructional features and working of devices used in non conventional energy sources
3. Understand economical and operational aspects of power plants
4. Calculate the efficiency of power generation cycles

**Motor skills:**

1. List technical details of components and subsystems of power plants
2. Draw layouts of different power plants
3. Operate devices using solar energy inputs

**Assignments:**

1. Visit to steam power plants/nuclear power plants/wind power plants/Hydro power plants and prepare a report.
2. Collect information & Technical details of nuclear power plants.
3. Collect information & Technical details of Steam power plants.
4. Collect information & Technical details of Solar & Wind power plants.
5. Study of economic and operational aspects of power plants (simple numerical).
6. Assignment on Coal & Ash Handling system.
7. Assignment on Waste Heat recovery systems.

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publication</b>
01	Power plant engineering	P. K. Nag	Tata McGraw Hill
02	Power plant engineering	Fredrick T. Mosse	East-West press
03	A text book of Power System Engineering	A. Chkrabarti and M. L. Soni	Dhanpat Rai and Co
04	A course in power plant engineering	Arora and Domkundwar	Dhanpat Rai and Co

**2. Computer Based Training Packages/Computer Aided Instructions Packages/CDs:**

1. Power Plant Familiarization Vol. I to IV.
  - Ash Handling System.
  - Gas Turbine and combined cycle power plant.
  - Power Station Safety.
  - Environmental pollution & pollution control.
  - Pulverizers and feeders.
  - Renewable energy sources,

(Developed by National Power Training Institute, South Ambazari Road, Nagpur)

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**

**COURSE CODE : ME**

**SEMESTER : FIFTH**

**SUBJECT TITLE : MECHATRONICS (ELECTIVE-I)**

**SUBJECT CODE : ME5007**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
03	02	03	80	20	--	--	25*	125

**Pre-requisites:** The student must know the following concepts:

1. Electrical motors, switches, wiring.
2. Basic sciences.
3. Basic digital electronics circuits

**Objectives:** The student will be able to

1. Identify various input and output devices in an automated system.
2. Understand and draw ladder diagrams.
3. Write simple programs for PLCs.
4. Interpret and use operations manual of a PLC manufacturer.
5. Use simulation software provided with the PLC.
6. Understand interfacing of input and output devices.

## Contents: Theory

Unit	Name Of The Topic	Hours	Marks
01	<b>INTRODUCTION TO SENSORS, TRANSDUCERS AND ACTUATORS</b> Principle, working and applications of Limit switches, Proximity switches like inductive, capacitive and optical (deflecting and through beam type) , Thumb wheel switches magnetic reed switches, Optical encoders-displacement measurement, rotary, incremental, opto-couplers. Actuator - solenoids - on-off applications, latching, triggering Types of relays- solid state Types of motors - DC motors, DC brushless motors, AC motors, stepper motors , servo motors	06	10
02	<b>8085 MICROPROCESSOR</b> Architecture, Pin configuration, working of microprocessor and applications. Introduction to ICs used for interfacing such as - Programmable peripheral devices, USART, memory, keyboard, display - LCD, LED, I/O device, ADC, DAC etc 8051 Microcontroller Architecture, Pin configuration, working of microcontroller, Applications Comparison of microprocessor and microcontroller, advantages and disadvantages	08	12
03	<b>PROGRAMMABLE LOGIC CONTROLLER (PLC)</b> Introduction, PLC definition, PLC block diagram, Difference between relay panel and PLC, power supply, input/output modules (analog, digital) concepts of sink/source, set/reset, latch/unlatch, advantages and disadvantages, installation, troubleshooting and maintenance	08	14
04	<b>SELECTION OF A PLC PROGRAMMING EQUIPMENT, PROGRAMMING FORMATS</b> Ladder diagrams and sequence listing, large process ladder diagram construction, flowcharting as a programming method Basic PLC functions Register basics, timer functions, counter functions Intermediate functions - Arithmetic functions, number comparison and number conversion functions Data handling functions - SKIP, Master control relay, Jump, Move, Block move, Table to register and register to table move functions. FIFO and LIFO functions, File Arithmetic and Logic function	16	24

<b>05</b>	<b>ONS AND CLR FUNCTIONS AND THEIR APPLICATIONS</b> PLC digital bit functions and applications Sequencer functions and cascading of sequencers PLC matrix functions Discrete and analog operation of PLC, Networking of PLCs. PLC auxiliary commands and functions,	<b>06</b>	<b>10</b>
	Online, offline, stop/run modes of operations, uploading/downloading between PLC and PC, Introduction to SCADA and DCS	<b>04</b>	<b>10</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Practical:**

**Skills to be developed:**

**Intellectual Skills:**

1. Identification of various sensors and transducers used in automated systems
2. Interpretation of circuits in automation
3. Interpretation and use

**Motor skills:**

1. Use of simulation software for PLCs
2. Preparation of ladder diagrams
3. Testing of interfacing ICs

**List of Practical:**

Term work shall consist of detailed report on the following experiments:

1. Identification and demonstration of different sensors and actuators.
2. Demonstration of the working of various digital to analog and analog to digital converters.
3. Development of ladder diagram, programming using PLC for
  - a) Measurement of speed of a motor
  - b) Motor start and stop by using two different sensors
  - c) Simulation of a pedestrian traffic controller
  - d) Simulation of four road junction traffic controller
  - e) Lift / Elevator control
  - f) Washing machine control
  - g) Tank Level control
  - h) Soft Drink vending machine control
4. Trace, interpret and demonstrate working of at least two electro pneumatic systems.
5. Trace, interpret and demonstrate working of at least two electro hydraulic systems.

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Mechatronics - Electronic control systems in Mechanical and Electrical Engineering	Bolton W.	Tata McGraw Hill Publishing
02	Introduction to Mechatronics and Measurement systems	Histand B.H. and Alciatore D.G.	Prentice Hall of India
03	Programmable Logic Controllers	John W. Webb and Ronald Reis	Prentice Hall of India
04	Programmable Logic Control - Principles and Applications	NIIT	Vikas Publishing, New Delhi
05	Mechatronics systems design	Kolk R.A. and Shetty D.	Mechatronics principles, concepts and applications
06	Mechatronics principles. Concepts and application	Mahalik N.P.	Tata McGraw Hill Publishing

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**  
**COURSE CODE : ME**  
**SEMESTER : FIFTH**  
**SUBJECT TITLE : PRINCIPLES OF MANAGEMENT**  
**SUBJECT CODE : ME5008**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	PR	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
04	--	03	80	20	--	--	--	100

**Pre-requisites:** Student must know the following concepts:

1. Industrial working and different requirements of production.
2. Different activities in organization.

**Objectives:** The student will able to

1. Explain the importance of management process in business.
2. Identify various components of management.
3. Describe Role & Responsibilities of a Technician in an Organizational Structure.
4. Apply various rules and regulations concerned with business & Social responsibilities of the Technician.

**Contents: Theory**

<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>01</b>	<p><b>Overview Of Business</b></p> <p>Types of Business</p> <ul style="list-style-type: none"> <li>• Service</li> <li>• Manufacturing</li> <li>• Trade</li> </ul> <p>Industrial sectors - Introduction to:</p> <ul style="list-style-type: none"> <li>• Engineering industry</li> <li>• Process industry</li> <li>• Textile industry</li> <li>• Chemical industry</li> <li>• Agro industry</li> </ul> <p>Globalization</p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Advantages &amp; disadvantages w.r.t. India</li> </ul> <p>Intellectual Property Rights (I.P.R.)</p>	<b>02</b>	<b>04</b>
<b>02</b>	<p><b>Management Process</b></p> <p>What is Management?</p> <ul style="list-style-type: none"> <li>• Evolution</li> <li>• Various definitions</li> <li>• Concept of management</li> <li>• Levels of management</li> <li>• Administration &amp; management</li> <li>• Scientific management by F.W. Taylor</li> </ul> <p>Principles of Management (14 principles of Henry Fayol)</p> <p>Functions of Management</p> <ul style="list-style-type: none"> <li>• Planning, Organizing, Directing, Controlling</li> </ul>	<b>07</b>	<b>10</b>

<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>03</b>	<b>Organizational Management</b> Organization: <ul style="list-style-type: none"> <li>• Definition</li> <li>• Steps in organization</li> </ul> Types of organization <ul style="list-style-type: none"> <li>• Line</li> <li>• Line &amp; staff</li> <li>• Functional</li> <li>• Project</li> </ul> Departmentation: <ul style="list-style-type: none"> <li>• Centralized &amp; Decentralized</li> <li>• Authority &amp; Responsibility</li> <li>• Span of Control</li> </ul> Forms of ownership <ul style="list-style-type: none"> <li>• Proprietorship</li> <li>• Partnership</li> <li>• Joint stock</li> <li>• Co-operative Society</li> <li>• Govt. Sector</li> </ul>	<b>07</b>	<b>10</b>
<b>04</b>	<b>Human Resource Management</b> Personnel Management <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition</li> <li>• Functions</li> </ul> Staffing <ul style="list-style-type: none"> <li>• Introduction to HR Planning</li> <li>• Recruitment Procedure</li> </ul> Personnel- Training & Development <ul style="list-style-type: none"> <li>• Types of training</li> <li>• Induction</li> <li>• Skill Enhancement</li> </ul> Leadership & Motivation <ul style="list-style-type: none"> <li>• Maslow's Theory of Motivation</li> </ul> Safety Management <ul style="list-style-type: none"> <li>• Causes of accidents</li> <li>• Safety precautions and accident prevention</li> </ul> Introduction to - <ul style="list-style-type: none"> <li>• Factories Act</li> <li>• ESI Act</li> <li>• Workmen Compensation Act</li> <li>• Industrial Dispute Act</li> </ul>	<b>08</b>	<b>14</b>

<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>05</b>	Financial Management Financial Management- Objectives & Functions Capital Generation & Management <ul style="list-style-type: none"> <li>• Types of capitals</li> <li>• Sources of raising capital</li> </ul> Budgets and accounts <ul style="list-style-type: none"> <li>• Types of Budgets</li> <li>• Production Budget (including Variance Report )</li> <li>• Labour Budget</li> <li>• Introduction to Profit &amp; Loss Account ( only concepts ) ;</li> <li>• Balance Sheet</li> </ul> Introduction to taxation: <ul style="list-style-type: none"> <li>• Excise Duty, Service Tax, Income Tax, VAT, Customs Duty, Sales Tax,</li> </ul>	<b>08</b>	<b>14</b>
<b>06</b>	<b>Materials Management</b> Inventory Management (No numericals) <ul style="list-style-type: none"> <li>• Meaning &amp; Objectives</li> </ul> ABC / VED / XYZ Analysis Economic Order Quantity <ul style="list-style-type: none"> <li>• Introduction &amp; Graphical Representation</li> </ul> Purchase Procedure <ul style="list-style-type: none"> <li>• Objects of Purchasing</li> <li>• Functions of Purchase Dept.</li> <li>• Steps in Purchasing</li> </ul> Modern Techniques of Material Management <ul style="list-style-type: none"> <li>• Introductory treatment to JIT / SAP / ERP</li> </ul>	<b>08</b>	<b>14</b>
<b>07</b>	Project Management ( No Numerical) Project Management <ul style="list-style-type: none"> <li>• Introduction &amp; Meaning</li> <li>• Introduction to CPM &amp; PERT Technique</li> <li>• Concept of Break-even Analysis</li> </ul> Quality Management <ul style="list-style-type: none"> <li>• Definition of Quality, Concept of Quality, Quality Circles, Quality Assurance</li> <li>• Introduction to TQM, Kaizen, 5 'S', &amp; 6 Sigma</li> </ul>	<b>08</b>	<b>14</b>
	<b>TOTAL</b>	<b>48</b>	<b>80</b>

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Industrial Engg & Management	Dr. O.P. Khanna	Dhanpal Rai & sons New Delhi
02	Business Administration & Management	Dr. S.C. Saksena, W.H. Newman	Sahitya Bhavan Agra
03	The process of Management	E. Kirby Warren, Andrew R. McGill	Prentice-Hall
04	Industrial Management	Rustom S. Davar	Khanna Publication
05	Industrial Organization & Management	Banga & Sharma	Khanna Publication
06	Industrial Management	Jhamb & Bokil	Everest Publication , Pune

**COURSE NAME : DIPLOMA IN MECHANICAL ENGINEERING**

**COURSE CODE : ME**

**SEMESTER : FIFTH**

**SUBJECT TITLE : PROFESSIONAL PRACTICES- IV**

**SUBJECT CODE : ME5009**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	TUT	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
--	02**	--	--	--	--	--	50*	50

**Pre-requisites:-**The student must know the following concepts:

1. Communication skills.
2. Basic technological concepts.

**Objectives:** The student will be able to

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture.

## Contents:

Sr.No.	Activity	Hours
01	<p><b>INDUSTRIAL VISITS</b> Industrial visits to be arranged and report of the same shall be submitted by the individual student, to form a part of the term work.(2 visits) Preferred Industries are as follows</p> <ul style="list-style-type: none"> <li>i) Automobile manufacturing / auto component manufacturing units to observe the working of SPM</li> <li>ii) Refrigeration and air conditioning manufacturing / servicing units / industries / workshops</li> <li>iii) Automobile service stations for four wheelers</li> <li>iv) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc.</li> <li>v) Wheel Balancing unit for light and/or heavy motor vehicles.</li> <li>vi) Food processing unit.</li> <li>vii) Textile industry machinery manufacturing / servicing units.</li> <li>viii) Hydro electric and Thermal power plants.</li> <li>ix) Automotive Research Association of India, Pune, Central Institute of Road Transport, Pune, Vehicle Research and Development establishment, Ahmednagar.</li> <li>x) Engine testing, exhaust gas analysis and vehicle testing PWD workshop.</li> <li>xi) Safety museum at Central Labour Institute, Sion, Mumbai</li> </ul>	10
02	<p><b>GUEST LECTURES</b> From field/industry experts, professionals to be arranged (2 Hrs duration), minimum 3 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work</p> <ul style="list-style-type: none"> <li>i) Electronic fuel injection systems</li> <li>ii) Exhaust gas analysis.</li> <li>iii) Vehicle testing.</li> <li>iv) Transducer application in automobiles.</li> <li>v) Environmental pollution &amp; control.</li> <li>vi) Vehicle aerodynamics &amp; design.</li> <li>vii) Earth moving machines.</li> <li>viii) Automobile pollution, norms of pollution control.</li> <li>ix) Biotechnology</li> <li>x) Nanotechnology</li> <li>xi) Rapid prototyping - Programmable logic controllers - TQM - MPFI - Hybrid motor vehicles</li> <li>xii) Packaging technology</li> <li>xiii) Appropriate technology</li> <li>xiv) Six sigma systems</li> <li>xv) LPG / CNG conversion kit.</li> </ul>	06

<p><b>03</b></p>	<p><b>GROUP DISCUSSION</b></p> <p>The students should discuss in group of six to eight students and write a brief report on the same, as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are (any one)</p> <ul style="list-style-type: none"> <li>i) CNG versus LPG as a fuel.</li> <li>ii) Petrol versus Diesel as a fuel for cars.</li> <li>iii) Trends in automobile market.</li> <li>iv) Load shading and remedial measures.</li> <li>v) Rain water harvesting.</li> <li>vi) Trends in refrigeration Technology.</li> <li>vii) Disaster management.</li> <li>viii) Safety in day to day life.</li> <li>ix) Energy Saving in Institute.</li> <li>x) Nanotechnology.</li> </ul>	<p><b>05</b></p>
<p><b>04</b></p>	<p><b>SEMINAR : (Any 2 Topics)</b></p> <p>Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 10 pages and deliver a seminar (Presentation time - 10 minutes for a group of 2 students)</p> <p>Mini Projects : (in a group of 4-5 students)</p> <ul style="list-style-type: none"> <li>i) Design / drawing of simple jigs, fixtures</li> <li>ii) Thermocouple based temperature controller.</li> <li>iii) Pump automation systems</li> <li>iv) Models of jigs / fixtures</li> <li>v) Layout design of SSI units / factory / workshop of the institute</li> <li>vi) Models of material handling route systems</li> </ul>	

	<p style="text-align: center;"><b>OR</b></p> <p><b>MODULAR COURSE ON ANY ONE OF THE SUGGESTED OR ALIKE RELEVANT TOPIC BE UNDERTAKEN BY A GROUP OF STUDENTS (MIN 10)</b></p> <ul style="list-style-type: none"> <li>i) LPG/CNG Conversion Of Vehicles</li> <li>ii) Advance Features In CAD-CAM</li> <li>iii) Basics Of PLC Programming</li> <li>iv) Die Design</li> <li>v) JIT Techniques</li> <li>vi) Non-Traditional Manufacturing Methods</li> <li>vii) Jigs And Fixture Design</li> <li>viii) 3D Modeling</li> <li>ix) Finite Element Method</li> <li>x) Mechatronics</li> <li>xi) Advanced Computer Programming</li> <li>xii) Maintenance of Home Appliances</li> <li>xiii) Value Stream Mapping</li> <li>xiv) Piping Technology</li> </ul>	
<b>05</b>	<p><b>STUDENT ACTIVITIES - Students In A Group Of 3 To 4 Shall Perform Any Two Of The Following Activities (Other Similar Activities May Be Considered) And Write A Report As A Part Of Term Work.</b></p> <p>Activities :-</p> <ul style="list-style-type: none"> <li>i) Collection of data regarding loan facilities or other facilities available through different organizations / banks to budding entrepreneurs.</li> <li>ii) Survey and interviews of successful entrepreneurs in nearby areas</li> <li>iii) Survey of opportunities available in thrust areas identified by Government or DIC.</li> <li>iv) Measuring Screw thread parameters on floating carriage dial micrometer and select the optimum diameter of wire.</li> <li>v) Survey of data regarding different types of pumps with specifications from manufacturers catalogue, local markets, end users (any other engineering products may be considered for survey)</li> <li>vi) Survey of farm implements used by farmers</li> </ul>	<b>05</b>
	<b>TOTAL</b>	<b>36</b>

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Nanotechnology	Mark Ratner and Daniel Ratner	Pearson Education, New Delhi
02	Computer Control of Manufacturing System	Yoram Korem	McGraw Hill Publication
03	Supply Chain Management	Sunil Chopra, Peter Meindl	Pearson Education, New Delhi

**COURSE NAME : ALL BRANCHES OF DIPLOMA IN ENGINEERING**

**COURSE CODE : ET/ME/CO**

**SEMESTER : FIFTH**

**SUBJECT TITLE : DEVELOPMENT OF GENERIC SKILLS-II**

**SUBJECT CODE : ME5011**

**TEACHING AND EXAMINATION SCHEME:**

Teaching Scheme		Examination Scheme						
TH	TUT	PAPER HRS	TH	INT	PR	OR	TW	TOTAL
01	--	02	40	10	--	--	--	50

**Pre-requisite:-** The student must know the following concepts:

1. Development of generic skills-I

**Objectives: -** The student will be able to

1. Acquire information from different sources and present it in their own words- own language
2. Prepare themselves for presenting certain topic in such a way that may impress the audience.
3. To take care of:
  - a) Body language
  - b) Eye contact
  - c) Voice pitch
  - d) Facial expressions
  - e) Overall impact on the audience

**Subject Title: DEVELOPMENT OF GENERIC SKILLS-II Subject Code: 5011****Contents: Theory**

<b>Unit</b>	<b>Name of the Topic</b>	<b>Hours</b>	<b>Marks</b>
<b>01</b>	<b>SOCIAL SKILLS</b> Society, social structure, develops sympathy and empathy.	<b>01</b>	<b>03</b>
<b>02</b>	<b>SWOT ANALYSIS</b> Concept , How to make use of SWOT Analysis	<b>01</b>	<b>03</b>
<b>03</b>	<b>INTER PERSONAL RELATION</b> Sources of conflict, Resolution of conflict Ways to enhance interpersonal relations	<b>02</b>	<b>05</b>
<b>04</b>	<b>PROBLEM SOLVING</b> <ul style="list-style-type: none"><li>• Steps in problem solving,</li><li>• Identify and clarify the problems</li><li>• Information gathering related to problem,</li><li>• Evaluate the evidence,</li><li>• Consider alternative solutions and their implications</li><li>• Choose and implement the best alternative</li><li>• Review</li></ul> Problem solving technique. (any one technique may be considered) 1) Trial and error 2) Brain storming, 3) Lateral thinking	<b>02</b>	<b>05</b>
<b>05</b>	<b>PRESENTATION SKILLS</b> <ul style="list-style-type: none"><li>• Body language</li><li>• Dress like the audience</li><li>• Posture, Gestures, Eye contact and facial expressions.</li><li>• Presentation Skill -</li><li>• Stage fright,</li><li>• Voice and language - Volume, Pitch, Inflection, Speed, Pause</li><li>• Pronunciation, Articulation, Language,</li><li>• Practice of speech.</li></ul> Use of aids -OHP,LCD projector, white board	<b>04</b>	<b>11</b>
<b>06</b>	<b>GROUP DISCUSSION AND INTERVIEW TECHNIQUES</b> <ul style="list-style-type: none"><li>• Introduction to group discussion,</li><li>• Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making</li><li>• Interview techniques: Necessity, Tips for handling common questions.</li></ul>	<b>02</b>	<b>05</b>

<b>07</b>	<b>WORKING IN TEAMS</b> <ul style="list-style-type: none"> <li>• Understand and work within the dynamics of a groups.</li> <li>• Tips to work effectively in teams,</li> <li>• Establish good rapport, interest with others and work effectively</li> <li>• with them to meet common objectives,</li> <li>• Tips to provide and accept feedback in a constructive and</li> <li>• considerate way ,</li> <li>• Leadership in teams, handling frustrations in group.</li> </ul>	<b>02</b>	<b>05</b>
<b>08</b>	<b>TASK MANAGEMENT</b> <ul style="list-style-type: none"> <li>• Introduction,</li> <li>• Task identification,</li> <li>• Task planning ,organizing and execution,</li> <li>• Closing the task</li> </ul>	<b>02</b>	<b>03</b>
	<b>TOTAL</b>	<b>16</b>	<b>40</b>

**Mini Project:** On Task Management. Decide any to be competed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

**Recommended Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
01	Adams Time management	Marshall Cooks	Viva Books
02	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India, Pvt Ltd
03	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
04	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
05	Decision making & Problem Solving	Adair, J	Orient Longman
06	Develop Your Assertiveness	Bishop , Sue	Kogan page India
07	Assertiveness	Marion E Haynes	Orient Longman

08	Make Every Minute Count	Steven L McShane and Mary	Kogan Page India
09	Organizational Behavior	Stephen P. Robbins	Tata McGraw Hill
10	Presentation Skills	Michael Hatton	Pretice Hall of India, Pvt Ltd
11	Stress Management Through Yoga and Meditation	Pandit Shambhu nath	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman