

# Courses of Study

**2019-20**

**Diploma in Mechanical  
Engineering**

**IILP**

## School of Engineering and Technology

Diploma (Part Time) Mechanical Engineering 2018-19																																						
Semester	Course I				Course II				Course III				Course IV				Course V				Course VI				Course VII				Course VIII	L	T	P	C	Contact Hours				
	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	Code									
I	4	1	0	5	3	0	4	5	3	1	2	5	2	0	4	4	2	0	2	3	0	0	0	0	0	0	0	0						14	2	12	22	28
	BS				PC				ES				PC				HSS																					
	Applied Mathemaics				Engineering Drawing				Applied Mechanics				Mechanical Engg. Workshop				Communication Skills																					
	Code				Code				Code				Code				Code																					
II	2	0	2	3	3	1	2	5	3	0	2	4	3	0	2	4	2	0	2	3	0	0	0	0	0	0	0	0						13	1	10	19	24
	BS				PC				PC				PC				HSS																					
	Basic Electrical & Electronics				Engg. Metrology				Advanced Manufacturing Processess				Mechanical Engg. Measurements				Technical Communication																					
	Code				Code				Code				Code				Code																					

## School of Engineering and Technology

Diploma (Part Time) Mechanical Engineering 2018-19																																									
Semester	Course I				Course II				Course III				Course IV				Course V				Course VI				Course VII				Course VIII				L	T	P	C	Contact Hours				
	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C									
III	3	0	2	4	3	0	2	4	3	0	2	4	3	0	2	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	8	19	20
	PC				PC				PC				PC				PWSI																								
	Fluid Mechanics				Strength of Materials				Thermal Engineering				Theory of Machines				Internship I																								
IV	3	0	2	4	3	0	2	4	3	0	2	4	2	0	2	3	0	0	8	4	0	0	0	0	0	0	0		0	0	0	0	11	0	16	19	27				
	PC				PC				PC				PC				PWSI																								
	Power Engg. & Refrigeration				Elements of Machine Design				Mechanical Engg. Materials				Computer Aided Drafting				Seminar																								

## School of Engineering and Technology

Diploma (Part Time) Mechanical Engineering 2018-19																																									
Semester	Course I				Course II				Course III				Course IV				Course V				Course VI				Course VII				Course VIII				L	T	P	C	Contact Hours				
	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C	L	T	P	C									
V	Code				Code																																				
	3	0	0	3	0	0	24	12	0	0	0	4	2	0	0	2	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	24	21	29
	PC				PC				PC				BS				PWSI				PWSI																				
	DEI				Project & Viva Voce				Internship II				Environmental Studies																												

Department Elective I					
Mechanical Engineering					
Course Code	Course	L	T	P	C
1	Production Technology & Management	3	0	0	3
2	Industrial Safety & Ethics	3	0	0	3
3	Automobile Engineering	3	0	0	3

Course		DTME101		Applied Mathematics						
Year	First	Semester	I	Prerequisite				XXX		
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	LAB	Theory	Lab	
4	1	0	5	20	20	10	-	50	-	100
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>										
<b>Course Objectives</b>										
1. Solve simultaneous equations in three variables using Cramer's rule										
2. Find partial fraction of proper and improper fraction.										
3. Derive factorization and de-factorization formulae to solve examples.										
4. Solve problems with given condition.										
5. Solve examples of inverse trigonometric ratios.										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Algebra</b> -Definition of a matrix of order $m \times n$ and types of matrices, Algebra of matrices with properties and examples, Transpose of a matrix with properties, Cofactor of an element of a matrix, Adjoint of matrix and inverse of matrix by adjoint method.	10

2	I	<b>Partial Fraction</b> -Definition of fraction, proper, improper fraction and partial fraction, Resolve proper fractions into partial fraction with denominator containing i) non repeated linear factors,  ii) repeated linear factors, iii) non repeated quadratic irreducible factors.	10
3	I	<b>Factorization and De-factorization Formulae-</b> Formulae for factorization and de-factorization with proof and examples.	8
4	I	<b>Straight Line-</b> Angle between two lines with proof. Examples, Condition of parallel and perpendicular lines, Point of intersection of two lines, equation of line passing through point of intersection with given condition. Perpendicular distance between point and line with proof and examples.	10
5	I	<b>Inverse Trigonometric Ratios-</b> Definition of inverse trigonometric ratios. Principal value of inverse trigonometric ratios. Relation between inverse trigonometric ratios with proof and examples.	10
<b>Total No. of Hrs</b>			48

### Course Outcome

Students should able to

- CO1** Students should able to apply the concepts of algebra to solve engineering related problems.
- CO2** Students should able to utilize basic concepts of trigonometry to solve elementary engineering problem.
- CO3** Students should able to solve the basic engineering problems under given conditions of straight lines.
- CO4** Students should able to use basic concepts of statistics to solve engineering related problems.

### Recommended Resources

**Text Books** Applied Mathematics (Author: [Dr. N. S. Chavan](#))

- Reference Books**
1. Mathematics for Polytechnic (Author: S.P. Deshpande)
  2. Engineering Mathematics (Author: S. Ramamrutham)
  3. Trigonometry (Author: S Rajasekaran)

**E-Resources :**            [www.khan Academy](http://www.khan Academy)  
                                     [www.nptel.ac.in](http://www.nptel.ac.in)

**Industry Integrated Learning Program**
**Department of Mechanical Engg**
**First Year IILP**
**Diploma in Mechanical Engineering**

Course		DTME102		Engineering Drawing						
Year	First			Semester	I			Prerequisite		XXX
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab Work	Theory	OR/PR	
3	0	4	5	20	20	10	25	50	25	150
Max. Time, End Semester Exam (Theory) -3Hrs.								End Semester Exam (Lab) - 2Hr		
<b>Course Objectives</b>										
1. Use Instruments for drawing, Scales, Lines, & there applications.										
2. Draw Conic curves, involute, Cycloid & know their applications										
3. Draw helix, spiral, & loci of points from given data.										
4. Visualize, interpret & draw orthographic views from given pictorial view.										
5. Visualize interpret & draw isometric view from given orthographic views										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Drawing Instruments and their uses</b> - Standard sizes of drawing sheets (ISO-A series) , Letters and numbers (single stroke vertical), Convention of lines and their applications, Scale (reduced, enlarged & full size) ,	7
	II	<b>Dimensioning technique-</b> as per SP-46 (Latest edition) – types and applications of chain, parallel and coordinate dimensioning.	6



2	I	<b>Conic Section</b> - To draw an ellipse by Arcs of circle method & Concentric circles method. Rectangle method , Rectangular hyperbola (Inclined axes).	7
	II	<b>Engineering curves</b> - To draw involutes of circle & pentagon, To draw a cycloid, Loci of points on any link of (i) 4 bar mechanism and (ii) Single slider crank mechanism with given specifications.	8
3	I	<b>Introduction to Orthographic projections.</b> Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) – elevation, plan and end view.	8
	II	<b>Sectional View-</b> Selection of section planes and drawing sectional view (simple object).	8
4	I	<b>Isometric View-</b> Isometric scale, comparison of true scale with isometric scale , Conversion of orthographic views into isometric View / projection.	8
<b>Total No. of Hrs</b>			52

### Course Outcome

<b>CO1</b>	Students should able to draw different engineering curves and know their applications.
<b>CO2</b>	Students should able to draw orthographic projections of different objects.
<b>CO3</b>	Students should able to visualize three dimensional objects and draw Isometric Projections.
<b>CO4</b>	Students should able to draw simple geometrical figures.

<b>List of Experiments</b>	
<b>Sr. No.</b>	<b>Description</b>
1	One sheet on drawing Letters, different types of lines.
2	One sheet on dimensional techniques.
3	Drawing Sheet - 1: Engineering Curves (2 Examples) a. Ellipse (Rectangle method), b. Parabola ( Rectangle method ),
4	Drawing Sheet – 4: Orthographic Projection (2 Examples)
5	Drawing Sheet – 5: Sectional Orthographic Projections (2 Examples)
6	Drawing Sheet – 6: Isometric Views & projections (2 Examples)

<b>Lab Work:</b>
<p>Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.</p>

<b>Practical/Oral/Presentation:</b>
<p>Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.</p>

Notes	
1.	One experiment from the regular practical syllabus will be conducted. (Total 15 Marks).
2.	Complete laboratory journal/records (05 Marks).
3.	Viva-voce (05 Marks).

Recommended Resources	
<b>Text Books</b>	Engineering Drawing (Author: <a href="#">M. W. Ingole</a> )
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Engineering Drawing (Author: N. D. Bhatt)</li><li>2. Engineering Drawing (Author: Amar Pathak)</li><li>3. Engineering Drawing (Author: R. K. Dhawan)</li></ol>
<b>E-Resources :</b>	Instructional / Learning CD developed by ARTADDICT. <a href="http://www.nptel.ac.in">www.nptel.ac.in</a>

**Industry Integrated Learning Program**
**Department of Mechanical Engg**
**First Year IILP**
**Diploma in Mechanical Engineering**

Course		TDME103		APPLIED MECHANICS						
Year		First		Semester	I		Prerequisite		XXX	
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab Work	Theory	Lab	
3	1	2	5	20	20	10	25	50	-	125
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>										
<b>Course Objectives</b>										
1. Calculate velocity ratio for given machine.										
2. Find Efficiency of given machine.										
3. Define related terms in mechanics.										
2. Calculate Components of forces.										
4. State conditions of equilibrium for given force system.										
5. Calculate reactions of beams for different static loading.										
6. Define terms related to friction, Apply conditions of equilibrium for forces acting on a body associated with friction.										
7. Calculate centroid of composite plain figures, Calculate centre of gravity of composite solids.										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Definitions-</b> Simple machine, compound machine, load, effort, mechanical advantage, velocity ratio, input of a machine, output of a machine efficiency of a machine, ideal machine. Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, Simple numerical problems.	5
	II	<b>Velocity Ratio for simple machines-</b> Simple axle and wheel, differential axle and wheel, Weston's differential pulley block, single purchase crab, screw jack, calculation of mechanical advantage, efficiency, identification of type such as reversible or not etc.	5
2	I	<b>Fundamentals and Force systems-</b> Definitions of mechanics, statics, dynamics, classification of force system according to plane coplanar and non-coplanar, sub classification of coplanar force system collinear, concurrent, non concurrent, parallel, like parallel, unlike parallel, general etc. Definition of a force, S.I. unit of a force, Characteristics of a force, effects of a force.	4
	II	<b>Resolution of a force and Moment of a force-</b> Definition, Method of resolution, along mutually perpendicular direction. Definition of moment, S. I. unit, Simple problems on moment.	4
	III	<b>Resultant of Force-</b> Definition of Resultant force, methods of composition of forces, Algebraic method for determination of resultant for concurrent and non-concurrent, parallel coplanar force system. Space diagram, vector diagram, Resultant of concurrent force system only. Simple problems on graphical method.	5
3	I	<b>Lami's Theorem-</b> Analytical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram. Statement and explanation of Lami's theorem, Application of Lami's theorem for solving various engineering problems.	5
		<b>Beams-</b> Definition, Types of beams (cantilever, simply supported, overhanging, fixed, continuous), Types of end supports (simple support, hinged, roller), classification of loads, point load, inclined point load, uniformly distributed load. Analytical method to determine reactions of	5

	II	simply supported, cantilever and over hanging beam subjected to point loads and UDL.	
4	I	<b>Definition</b> -Friction, coefficient of friction, angle of friction, angle of repose, Types of friction, advantages and disadvantages.	4
	II	<b>Equilibrium of body on Horizontal and inclined plane</b> - Equilibrium of body on horizontal plane subjected to horizontal and inclined force. Equilibrium of body on inclined plane subjected to forces applied parallel to the plane only.	5
5	I	<b>Centroid</b> - Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure with not more than two geometrical figures.	5
	II	<b>Center of gravity</b> -Definition, center of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block.	5
		<b>Total No. of Hrs</b>	52

### Course Outcome

Students should able to

- |            |   |
|------------|---|
| <b>CO1</b> | Students should able to identify the force systems for given conditions by applying the basics of mechanics.  |
| <b>CO2</b> | Students should able to select the relevant simple lifting machine for given purpose.                         |
| <b>CO3</b> | Students should able to determine unknown forces of different engineering systems.                            |
| <b>CO4</b> | Students should able to check the stability of different force systems.                                       |
| <b>CO5</b> | Students should able to apply the principles of friction in various force systems.                            |
| <b>CO6</b> | Students should able to find the centroid and centre of gravity of various components in engineering systems. |

<b>List of Experiments</b>	
<b>Sr. No.</b>	<b>Description</b>
1	Calculate velocity ratio, mechanical advantage, efficiency and obtain the law of machine for Differential wheel and axle.
2	Calculate velocity ratio, mechanical advantage, efficiency and obtain the law of machine for single purchase crab.
3	Calculate velocity ratio, mechanical advantage, efficiency and obtain the law of machine for screw jack.
4	Calculate velocity ratio, mechanical advantage, efficiency and obtain the law of machine for Geared pulley block.
5	Verify law of moments.
6	Verify law of polygon of forces by using universal force table.
7	Verify Lami's theorem by using universal force table.
8	Solve problems on coplanar concurrent forces, parallel forces with the help of simply supported beam reaction apparatus.

#### **Lab Work:**

Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.

#### **Practical/Oral/Presentation:**

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

Notes	
4.	One experiment from the regular practical syllabus will be conducted. (Total 15 Marks).
5.	Complete laboratory journal/records (05 Marks).
6.	Viva-voce (05 Marks).

### Recommended Resources

**Text Books**            Applied Mechanics (Author: [M. M. Malhotra](#))

**Reference Books**

1. Engineering Mechanics (Author: R.S.Khurmi)
2. Applied Mechanics (Author: S. Ramamrutham)
3. Essentials of Engg. Mech. (Author: S Rajasekaran)

**E-Resources :**            <http://www.asnu.com.au>  
                                      [www.nptel.ac.in](http://www.nptel.ac.in)



**Industry Integrated Learning Program**
**Department of Mechanical Engg**
**First Year IILP**
**Diploma in Mechanical Engineering**

Course		DTME104		Mechanical Engineering Workshop						
Year		First		Semester	I			Prerequisite		XXX
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab work	Theory	OR/PR	
2	0	4	4	20	20	10	25	-	50	125
								<b>End Semester Exam (Lab) - 2Hr</b>		
<b>Course Objectives</b>										
1. Know basic workshop processes.										
2. Read and interpret job drawing.										
3. Identify, select and use various marking, measuring, holding, striking and cutting tools & equipments										
4. Operate, control different machines and equipments, Inspect the job for specified dimensions										
5. Produce jobs as per specified dimensions										
6. Adopt safety practices while working on various machines.										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Carpentry shop</b> - Introduction, Various types of woods, Different types of tools, machines and accessories.	

			10
2	I	<b>Welding shop</b> – Introduction, Types of welding, ARC welding, Gas welding, Gas Cutting, Welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece, Different types of flame, Elementary symbolic representation,	8
	II	<b>Welding Safety</b> - Safety precautions in welding safety equipment's and its use in welding processes.	2
3	I	<b>Fitting shop-</b> Introduction, Various marking, measuring, cutting, holding and striking tools, Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc,	6
	II	<b>Drilling</b> - Working Principle of Drilling machine, Tapping dies its use, Safety precautions and safety equipments.	4
4	I	<b>Plumbing shop-</b> Introduction, Various marking, measuring, cutting, holding and striking tools, Different G.I. pipes, PVC pipes, flexible pipes used in practice, G. I. pipes and PVC pipes fittings and accessories, Adhesive solvents chemical action, Piping layout.	10
5	I	<b>Sheet metal shop-</b> Introduction, Various types of tools, equipments and accessories, Different types of operations in sheet metal shop, Soldering and riveting, safety precautions.	10
		<b>Total No. of Hrs</b>	50

**Course Outcome**

<b>CO1</b>	Students should able to Select tools and machinery according to job.
<b>CO2</b>	Students should able to Use hand tools in the different shops performing different operation.
<b>CO3</b>	Students should able to Operate equipment and machinery in different shops.
<b>CO4</b>	Students should able to Prepare the job according to drawing.

**List of Experiments**

<b>Sr. No.</b>	<b>Description</b>
1	One Fitting job involving following operations: filing to size, one simple male female joint, drilling and tapping.
2	One carpentry job involving estimation of cost by students; Ex. Notice Board, Door frame etc
3	One welding job involving estimation of cost by students; Ex. Cots, benches, grills etc.
4	One plumbing job with use of various types of joints, couplings, water taps etc.

**Lab Work:**

Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.

**Notes**

1.	Each student should perform all the above experiments.
2.	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
3.	Students should undergo good laboratory practices.

**Practical/Oral/Presentation:**

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

**Recommended Resources**

<b>Text Books</b>	Applied Mathematics (Author: <a href="#">Dr. N. S. Chavan</a> )
<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Workshop (Author: S. K. Hajara Chaudhary)</li><li>2. Production Technology (Author : R K Jain)</li><li>3. Workshop Technology (Author: B. S. Raghuwanshi)</li></ol>
<b>E-Resources :</b>	Learning Materials Transparencies, CBT Packages developed by N.I.T.T.E.R. Bhopal. <a href="http://www.nptel.ac.in">www.nptel.ac.in</a>

**Industry Integrated Learning Program**

**Department of Mechanical Engg**

**First Year IILP**

**Diploma in Mechanical Engineering**

Course		DTME201		Basic Electrical & Electronics						
Year	First	Semester	II	Prerequisite				XXX		
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab work	Theory	OR/PR	
2	0	2	3	20	20	10	25	<b>50</b>	-	125
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>										
<b>Course Objectives</b>										
1. Describe the electric power system and A. C. supply.										
2. Define and state the measuring instruments										
3. Describe the fundamental of solid state devices										
4. Describe the Transistor and BJT circuit.										

Course Content			
Unit No.	Module No.	Content	Hours
<b>1</b>	<b>I</b>	<b>Electric Power System and A. C. Supply</b> Electrical power supply system generation, transmission, distribution. AC supply & DC Supply. Definitions: cycle, frequency, phase, period, maximum value, average value, r.m.s. value. Concept of current, voltage, power & energy in series R-L and R-C circuits. Star and Delta circuit, Line	10

		and Phase relationship, power equation.	
2	I	<b>Measuring Instruments, AC Motor, DC Motor and Transformer</b> Introduction to construction, operation and use of AC and DC ammeter, voltmeter Electro-dynamic wattmeter, energy meter and digital multimeter. Speed-torque characteristics. D.C. shunt, series and compound motors. EMF equation and transformation ratio. Load test for efficiency and regulation. Specifications and rating. Auto transformer & 3 phase transformer concept only. Applications of transformers. Construction and principle of operation of 3 phase induction motor.	10
3	I	<b>Fundamentals of solid state Devices</b> Material classification conductors, semiconductors and insulators, Energy band diagram intrinsic and extrinsic semiconductors Solid state Devices -- schematic symbols, working principle and applications of Diode, Zener diode, BJT, FET,UJT, Photo-devices- LDR, Photo diode, Photo-transistor, LED, 7 segment display opto-coupler, LCD type and operation	10
4	I	<b>Transistor</b> Working of NPN and PNP transistor, Configurations CB., CC and CE , Biasing circuits, concept of thermal runaway , construction and use of heat sink	10
	II	<b>BJT Circuits</b> BJT as an amplifier single stage amplifier, Multistage amplifier, RC coupled, direct coupled and transformer coupled amplifier, their frequency response and applications BJT as a switch	10
<b>Total No. of Hrs</b>			50

**Course Outcome**
**Students should able to**

- |            |   |
|------------|---|
| <b>CO1</b> | Use principles of electric and magnetic circuits to solve engineering problems. |
| <b>CO2</b> | Determine voltage and current in A. C. Circuits.                                |
| <b>CO3</b> | Use relevant electronic components safely.                                      |
| <b>CO4</b> | Use relevant electronic/electric protective devices safely.                     |

**List of Experiment**

Sr. No.	Description
1	Find the performance of R-L series circuit with single phase A.C. supply and determine the current, power and power factor.
2	Find the performance of R-C series circuit with single phase A.C. supply and determine the current, power and power factor.
3	Verify the relationship between line and phase values of voltages and currents in three phase balanced star and delta connected load.
4	Identify various passive components such as resistors, capacitors, inductors, switches, transformers, breadboard and cables and write their specifications.
5	Identify various active electronic components such as diode, BJT, FET, UJT, LED, Photodiode.
6	Use of multimeter (analogue and digital) for current, voltage and resistance measurement Testing of various electronics components.
7	Measure frequency and voltage using CRO.

**Lab Work:**

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<b>Notes</b>	
4.	Each student should perform all the above experiments.
5.	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
6.	Students should undergo good laboratory practices.

<b>Practical/Oral/Presentation:</b>
Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

## Recommended Resources

### Reference Books

1. Basic electrical engineering (Mittal and Mittal)
2. Basic electronic and electrical engineering (Jegathesan .V)



**Industry Integrated Learning Program**
**Department of Mechanical Engg**
**First Year IILP**
**Diploma in Mechanical Engineering**

Course		DTME202		Engineering Metrology						
Year		First		Semester	II		Prerequisite		XXX	
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab work	Theory	OR/PR	
3	1	2	5	20	20	10	25	50	25	150
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>								<b>End Semester Exam (Lab) - 2Hr</b>		
<b>Course Objectives</b>										
1. Define and state the basic metrology and construction and working of comparator										
2. Describe construction and use different instruments for linear measurements										
3. Write construction and use of different instruments for angular measurement.										
4. Describe screw threads measurement and gear testing.										
5. Describe different methods of measurement of surface finish										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Metrology Basics</b> Definition of metrology, objectives 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 instrument, Precautions while using an instruments for getting higher precision and accuracy. Concept of least count of measuring instruments	8

	II	<b>Comparator</b> Definition and introduction to line standard, end standard, Wavelength standard and their comparison, Slip gauge and its accessories. Definition, Requirement of good comparator, Classification, use of comparators, Working principle of comparators, Dial indicator, Sigma comparator	8
2	I	<b>Angular Measurement</b> Instruments for Angular Measurements, Working And Use of Universal Bevel Protractor, Sine Bar, Spirit Level, Principle of Working of Clinometers, Angle Gauges.	8
3	I	<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 for internal and external threads , Three wire method, Thread gauge, screw thread micrometer, Working principle of floating carriage micrometer.	8
	II	<b>Gear Measurement &amp; Testing</b> Analytical and functional inspection, Measurement of tooth thickness by constant chord method, base tangent method, gear tooth vernier, Errors in gears such as backlash, run out, composite, concentricity, Parkinson gear tester	8
4	I	<b>Measurement of Surface Finish</b> Primary and secondary texture, Sampling length, Lay, direction of lay, Sources of lay and its significance, CLA, Ra, RMS values and their interpretation, Symbol for designating surface finish on drawing, Various techniques of qualitative analysis	6
	II	<b>Machine Tool Testing</b> Parallelism, Straightness, Squareness, Coaxiality, roundness, run out, alignment testing of machine tools such as lathe, milling machine and drilling machine as per IS standard procedure. Study of optical flat for flatness testing.	6
<b>Total No. of Hrs</b>			52

## Beyond the Syllabus

**Course Outcome**
**Students should able to**

<b>CO1</b>	Understand and calculate the least count of all basic measuring instruments.
<b>CO2</b>	Select and use appropriate instrument/s for specific measurement.
<b>CO3</b>	Understand the systems of limits, fits and tolerances and correlate with machine drawing and manufacturing processes.
<b>CO4</b>	Understand the machine tool testing .

**List of Experiments**

<b>Sr. No.</b>	<b>Description</b>
1	Measurement of various dimensions & dimensional parameters using instruments such as radius gauge, pitch screw gauge, filler gauge, vernier caliper, vernier height gauge, vernier depth gauge, dial type vernier caliper, micrometer, inside micrometer, tube micrometer.
2	To set the Adjustable snap gauge GO end and NOGO end for a given dimensions using slip gauges.
3	Inspection of given components using Dial Indicator as a mechanical comparator.
4	To check the given component using high pressure Dial type pneumatic comparator.
5	To find unknown angle of component using bevel protractor and verify the same using sine bar/ sine center and slip gauges.
6	Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge & their verification with the help of profile projector/tool maker's microscope.
7	Measurement of gear tooth elements by using gear tooth vernier caliper and verification of gear tooth profile using profile projector.

**Lab Work:**

Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.

**Notes**

- |    |  |
|----|--|
| 7. | Each student should perform all the above experiments.   |
| 8. | The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly. |
| 9. | Students should undergo good laboratory practices.   |

**Practical/Oral/Presentation:**

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

**Recommended Resources****Reference Books**

1. Engineering Metrology (R. K. Jain)
2. Text Book of Metrology (M. Mahajan)

**Industry Integrated Learning Program**

**Department of Mechanical Engg**

**First Year IILP**

**Diploma in Mechanical Engineering**

Course		DTME203		Advanced Manufacturing Processes						
Year	First	Semester	II	Prerequisite				XXX		
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab work	Theory	OR/PR	
3	0	2	4	20	20	10	25	<b>50</b>	<b>25</b>	150
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>								<b>End Semester Exam (Lab) - 2Hr</b>		
Course Objectives										
1. Define and state use of surveys and also its classification										
2. Describe construction and use different instruments for linear measurements										
3. Write construction and use of different instruments for setting offsets and Calculate the area of field										
4. Describe construction and state use of prismatic compass.										
5. Describe different methods of orientation of Plane Tabling										

Course Content			
Unit No.	Module No.	Content	Hours
<b>1</b>	<b>I</b>	<b>Non Traditional Machining</b> Need and importance, classification AJM, WJM, EDM, W-EDM - setup, working, process parameters, advantages, disadvantages and applications. PAM, LBM - setup, working, process parameters, advantages, disadvantages and applications.	8

2	I	Introduction, advantages of CNC, open loop and closed loop control, axis identification, absolute & incremental coordinate system G codes and M codes, Fundamental part programming - simple lathe and milling programmes, Safety Procedures, Adaptive controls, Displays and indicators.	8
3	I	Introduction, classification of Broaching machines, basic parts of horizontal broaching machine & their functions, applications, advantages and limitations of Broaching machine, Capstan, turret lathe & automats, Planer and planomiller function of parts & operations. Boring Machines – types, tools and operations.	8
4	I	<b>Milling:</b> Introduction, classification ,basic parts of column & knee type milling machine & their functions, standard milling cutters, milling operations like plain milling, side milling, straddle milling, gang milling, face milling - slot milling, slitting. Up milling & down milling, cutting parameters.	5
	II	<b>Gear Cutting:</b> Introduction, gear manufacturing methods, universal dividing head & indexing methods, gear shaping & gear hobbing - setup, working, advantages, disadvantages, applications, Gear finishing methods-grinding, shaving, burnishing.	5
5	I	<b>Grinding Machines</b> Classification and working of grinding machine - surface, cylindrical, centre less, grinding wheel specifications, grinding wheel dressing & truing. Selection criteria for grinding wheel. Balancing of grinding wheels, safety precautions.	6
	II	<b>Super Finishing</b> Methods of surface finishing like honing, lapping, burnishing, polishing and buffing - setup, working, advantages, limitations and applications.	6
	III	<b>Maintenance</b> Need and importance of maintenance activity, Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records.	6
<b>Total No. of Hrs</b>			52

### Course Outcome

#### Students should able to

<b>CO1</b>	Understand the working of Broaching Machine, Milling Machine, Gear Cutting machines.
<b>CO2</b>	Understand the working of Grinding Machines, Surface finishing machines.
<b>CO3</b>	Know the Operation and control of different CNC machine tools.
<b>CO4</b>	Adopt safety practices while working on various machines.
<b>CO5</b>	Work as a maintenance engineer.

#### List of Experiments

Sr. No.	Description
1	Industrial visit to observe at least one nontraditional machining process and write a report individually on visit.
2	One simple Job on CNC Lathe Machine and Verification on simulation software (One job /max. four students).
3	One simple Job on CNC Milling Machine and Verification on simulation software (One job /max. four students).
4	Industrial visit to observe Broaching machine, Boring machine, Planer machine and report on the same.
5	One job of gear cutting (spur gear /helical gear) by using simple indexing method (max. four Students per job).
6	One job containing surface grinding / cylindrical grinding operation. (max. four students per job).

#### Lab Work:

Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.

<b>Notes</b>	
10.	Each student should perform all the above experiments.
11.	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
12.	Students should undergo good laboratory practices.

<b>Practical/Oral/Presentation:</b>
Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

### Recommended Resources

#### Reference Books

1. Elements of workshop Technology-Volume II (S. K. Hajra Chaudary, Bose, Roy)
2. Production Technology Volume- II (O. P. Khanna & Lal)
3. Nonconventional Machining (P.K.Mishra)



**Industry Integrated Learning Program**
**Department of Mechanical Engg**
**First Year IILP**
**Diploma in Mechanical Engineering**

Course		DTME204		Mechanical Engineering Measurements						
Year		First		Semester	II		Prerequisite			XXX
Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)				End Semester Examination		Total Marks
L	T	P	C	CIA-1	CIA-2	CIA-3	Lab work	Theory	Lab	
3	0	2	4	20	20	10	25	50	-	125
<b>Max. Time, End Semester Exam (Theory) -3Hrs.</b>										
<b>Course Objectives</b>										
1. Define and state the static characteristics										
2. Define and state the dynamic characteristics										
3. Describe the displacement and pressure measurement										
4. Describe the non electric method electric methods.										
5. Describe the methods of flow measurement.										

Course Content			
Unit No.	Module No.	Content	Hours
1	I	<b>Types of measurement, classification of instruments Static terms and characteristics-</b> Range and Span, Accuracy and Precision, Reliability, Calibration, Hysteresis and Dead zone, Drift, Sensitivity, Threshold and Resolution, Repeatability and Reproducibility, Linearity.	7

	II	<b>Dynamic characteristics-</b> Speed of response, Fidelity and Dynamic errors, Overshoot. <b>Measurement of error-</b> Classification of errors, environmental errors, signal transmission errors, observation errors, operational errors. <b>Transducers :</b> Classification of transducers, active and passive, resistive, inductive, capacitive, piezo-resistive, thermo resistive	6
2	I	<b>Displacement Measurement</b> Capacitive transducer, Potentiometer, LVDT, RVDT, Specification, selection & application of displacement transducer. Optical measurement scale and encoders	8
	II	<b>Pressure Measurement</b> Low pressure gauges- McLeod Gauge, Thermal conductivity gauge, Ionization gauge, Thermocouple vacuum gauge, High Pressure gauge-Diaphragm, Bellows, Bourdon tube, Electrical resistance type, Photoelectric pressure transducers, piezoelectric type, Variable capacitor type	8
3	I	<b>Non-electrical methods-</b> Bimetal , Liquid in glass thermometer and Pressure thermometer	6
	II	<b>Electrical methods-</b> RTD, Platinum resistance thermometer, Thermistor, Thermoelectric methods - elements of thermocouple, Seebeck series, law of Intermediate temperature, law of intermediate metals, thermo e.m.f. measurement. Pyrometers- radiation and optical	6
4	I	<b>Flow Measurements</b> Rota meter, Variable velocity meter Anemometer, Hot wire anemometer, Electromagnetic flow meter, Ultrasonic flow meter ,Turbine meter ,Vortex shedding flow meter	6
	II	<b>Miscellaneous Measurement</b> Hair hygrometer, Sling psychrometer, Tool Dynamometer, Eddy Current Dynamometer, Strain Gauge Transmission Dynamometer.	6
<b>Total No. of Hrs</b>			52

## Beyond the Syllabus

**Course Outcome**
**Students should able to**

<b>CO1</b>	Understand the principle of operation of an instrument.
<b>CO2</b>	Appreciate the concept of calibration of an instrument
<b>CO3</b>	Select Suitable measuring device for a particular application
<b>CO4</b>	Identify different types of errors.

**List of Experiment**

Sr. No.	Description
1	Study the specifications of measuring instruments/ devices.
2	Understand the methods of measurements and instrument characteristics with demonstration of any one measuring device.
3	Measure displacement by using inductive transducer (LVDT) and verify its characteristics.
4	Measurement of temperature by using Thermocouple and verifying it by thermometer.
5	Measurement of flow by using rotameter.
6	Measurement of force & weight by using a load cell.
7	Measure speed of rotating shaft by stroboscope/ magnetic/ inductive pick up.

**Lab Work:**

Lab Work assessment shall be conducted for the Project, Laboratory and Seminar. Lab work is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by corresponding course teacher. At the end of the semester, the final grade for a Lab Work shall be assigned based on the performance of the student and is to be submitted to the University.

**Notes**

13.	Each student should perform all the above experiments.
14.	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
15.	Students should undergo good laboratory practices.

**Practical/Oral/Presentation:**

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University, authenticate and seal it. Sealed envelope shall be submitted to the head of the department or authorized person.

**Recommended Resources**

**Reference Books**

1. Mechanical Measurements & Control (D. S. Kumar)
2. Mechanical & Industrial Measurements (R.K. Jain)