



Government Polytechnic, Mumbai

Department of Civil Engineering

**P-19 Curriculum
(Sandwich Pattern)**

**Semester-II
(Course Contents)**

GOVERNMENT POLYTECHNIC MUMBAI
 (Academically Autonomously Institute, Government of Maharashtra)
Teaching and Examination Scheme (P19)
With effect from AY 2019-20

Programme: Diploma in Civil Engineering (Sandwich Pattern)

Term / Semester - II

Course Code	Course Title	Teaching Hours/Contact Hours				Credits	Examination Scheme (Marks)						
		L	P	TU	Total		Theory			PR	OR	TW	Total
							TH	TS1	TS2				
SC19102	Engineering Physics	3	2	--	5	5	60	20	20	25*	--	25	150
SC19110	Engineering Mathematics	4	--	--	4	4	60	20	20	--	--		100
CE19201	Building Drawing	1	4	--	5	5	--	--	--	50*	--	50	100
CE19202	Surveying I	3	4	--	7	7	60	20	20	50*	--	50	200
AM19201	Engineering Mechanics	3	2	--	5	5	60	20	20	25	--	25	150
CE19203	Libre Office Draw (Spoken Tutorials)	--	4 [#]	--	4	4 [#]	--	--	--	--	--	--	--
	Total	14	16	--	30	30	240	80	80	150	--	150	700
Student Centered Activity(SCA)					05								
Total Contact Hours					35								

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR-Practical, OR-Oral, TW: Term Work (progressive assessment)

* Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: Duration of Examination--TS1&TS2 -1 hour , TH- 2 hours 30 minutes, PR/OR – 3 hours per batch , SCA- Library - 1 hour, Sports- 2 hours, Creative Activity-2 hours
 Self, on- line learning Mode through MOOCs /Spoken Tutorials / NPTEL / SWAYAM / FOSSEE etc.

Department Coordinator,
 Curriculum Development,
 Dept. of Civil Engineering

Head of Department
 Dept. of Civil Engineering

In-Charge
 Curriculum Development Cell

Principal

Programme : Diploma in CE/ ME (Sandwich pattern)										
Course Code: SC19102				Course Title: Engineering Physics						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2Hrs.30 minutes)	TS1 (1 Hr.)	TS2 (1Hr.)	PR	OR	TW	Total
3	2	--	5	60	20	20	25*	--	25	150

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination

Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term

Rationale:

The subject is included under the category of science. The special feature of the subject is to develop the laboratory skill using principles of scientific phenomenon. This course will serve to satisfy the need of the technical students for their development in technical field. The course is designed by selecting the topics which will develop intellectual skills of the students and will guide students to solve broad based engineering problems. Ultimately the focus of the course is to develop psychomotor skills in the Students.

Course Outcomes: Student should be able to

CO1	State the different physical quantities identify the proper unit of it and to estimate in the measurement of physical quantities.
CO2	Apply laws of motion in various engineering applications
CO3	Identify the properties of solid , liquid such as elasticity, liquid friction ,viscosity and surface tension
CO4	Analyze types of waves and acoustics of good building.
CO5	Create awareness about the properties and application of light, LASER in engineering field.

Course Content Details:

Unit No	Topics / Sub-topics
1	<p>Units and Measurements</p> <p>1.1 Fundamental Physical quantities, examples. 1.2 Derived physical quantities, examples. 1.3 Definition and requirements of unit 1.4 System of units, C. G. S., M. K. S. and S. I. units. 1.5 Rules to write the unit and conventions of units and Significant figures, rules to write significant figures. 1.6 Error – Definition, types of errors and estimation of errors 1.7 Numerical</p> <p>Course Outcome: CO1 Teaching Hours : 8 hrs. Marks: 6 (R- 2, U-2, A-2)</p>
2	<p>Motions</p> <p>2.1 Linear motion –Definition – distance, displacement, velocity, equation of motions, acceleration due to gravity and under gravity, numerical 2.2 Periodic motions : a)Oscillatory motion, b)Vibratory motion, c) S.H.M d) Circular motion. (only definition and examples), 2.3 Angular motion: a) Definition: Time period, frequency, amplitude, wavelength, and phase. Uniform circular motion, Radius vector, linear velocity, Angular velocity , Angular acceleration,Numerical. b) Relation between linear velocity and angular Velocity (derivation), Radial or centripetal acceleration, Three equations of motion (no derivations) Centripetal and Centrifugal force, examples and applications. 2.4 Kinetics 2.4.1 Definition Kinetics , momentum, impulse, impulsive force 2.4.2 Newton’s laws of motion with equation 2.4.3 Application of Newton’s laws of motion 2.4.4 Definition and unit - work power energy 2.4.5 Work energy principle 2.4.6 Numerical.</p> <p>Course Outcome: CO2 Teaching Hours :10 hrs. Marks: 10 (R- 2 , U-4 , A-4)</p>
3	<p>General Properties of Matter</p> <p>3.1 Elasticity: 3.1.1 Deforming force, restoring force, Elastic, plastic and rigid substances, and their examples. 3.1.2 Definition of elasticity, stress, strain and its types. 3.1.3 Hooke’s Law and elastic limit. 3.1.4 Stress - Strain curve, yield point, breaking point. 3.1.5 Young’s Modulus, Bulk modulus and Modulus of rigidity</p>

	<p>Definition and relation among them.</p> <p>3.1.6 Factor of safety.</p> <p>3.1.7 Applications of elasticity</p> <p>3.1.8 Numerical.</p> <p>3.2 Liquid Friction</p> <p>3.2.1 Friction liquid, pressure</p> <p>3.2.2 pressure height relation</p> <p>3.3.3 Pascal's law, Archimedes' Principle and application of it.</p> <p>3.3 Viscosity</p> <p>3.3.1 Concept and Definition of viscosity, velocity gradient.</p> <p>3.3.2 Newton's law of viscosity, Co-efficient of viscosity, unit of viscosity</p> <p>3.3.3 Stokes' law, terminal velocity, derivation of Stokes' formula.</p> <p>3.3.4 Streamline flow, turbulent flow, critical velocity, examples.</p> <p>3.3.5 Reynolds' number and its significance.</p> <p>3.3.6 Applications of viscosity.</p> <p>3.3.7 Numerical.</p> <p>3.4 Surface Tension :</p> <p>3.4.1 Concept of surface tension.</p> <p>3.4.2 Adhesive and cohesive forces, examples.</p> <p>3.4.3 Laplace's Molecular theory of surface tension</p> <p>3.4.4 Angle of contact, its significance.</p> <p>3.4.5 Expression for surface tension by capillary rise method.</p> <p>3.4.6 Effect of impurity and temperature.</p> <p>3.4.7 Applications of surface tension.</p> <p>3.4.8 Numerical.</p> <p>Course Outcome: CO3 Teaching Hours: 12 hrs. Marks: 18 (R- 4 , U- 6 , A- 8)</p>
4	<p>Sound and Acoustic</p> <p>4.1 Sound Waves :</p> <p>4.1.1 Wave motion, types of waves – progressive, longitudinal and transverse waves.</p> <p>4.1.2 Characteristics of longitudinal and transverse waves and comparison.</p> <p>4.1.3 Free or natural vibrations and forced vibrations, resonance – definition and examples.</p> <p>4.1.4 Determination of velocity of sound by resonance method.</p> <p>4.1.5 Numerical.</p> <p>4.2 Acoustics :</p> <p>4.2.1 Definition of echo, reverberation , reverberation time and acoustic</p> <p>4.2.2 Sabine's formula for reverberation time (no derivation)</p> <p>4.2.3 Factors affecting acoustics of sound.</p> <p>4.2.4 Acoustical planning of building.</p> <p>4.2.5 Numerical.</p> <p>Course Outcome: CO4 Teaching Hours: 8 hrs. Marks: 10 (R- 2 , U- 4 , A- 4)</p>

5	<p>Optics and Optical Fiber</p> <p>5.1 Optics :</p> <p>5.1.1 Revision of reflection and refraction of light.</p> <p>5.1.2 Laws of refraction, Snell's law.</p> <p>5.1.3 Determination of refractive index.</p> <p>5.1.4 Dispersion, dispersive power, Prism formula (derivation)</p> <p>5.1.5 Critical angle, Total internal reflection. Examples and applications.</p> <p>5.1.6 Numerical.</p> <p>5.2 Optical Fiber :</p> <p>5.2.1 Principle of propagation of light through optical fiber.</p> <p>5.2.2 Structure of optical fiber.</p> <p>5.2.3 Applications.</p> <p>5.2.4 Difference between optical fiber cable and electric cable wire</p> <p>Course Outcome: CO5 Teaching Hours : 4 hrs. Marks: 10 (R- 2 , U- 4 , A- 4)</p>
6	<p>LASER</p> <p>6.1 LASER introduction,</p> <p>6.2 Properties of laser,</p> <p>6.3 Spontaneous and stimulated emission,</p> <p>6.4 Population inversion, Optical pumping,</p> <p>6.5 Applications of LASER.</p> <p>Course Outcome: CO5 Teaching Hours : 3 hrs. Marks: 6 (R- 2 , U- 2 , A-2)</p>

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Units and Measurements	2	2	2	6
2	Motion	2	4	4	10
3	General properties of matter	4	6	8	18
4	Sound and Acoustic	2	4	4	10
5	Optics and Optical fiber	2	4	4	10
6	LASER	2	2	2	6
Total		14	22	24	60

List of experiments:

Sr. No.	Unit No	CO	List of Experiments	Hours
1	1	CO 1	To know your Physics laboratory and use of scientific calculator.	2
2	1	CO 1	To measure the dimensions of given objects and to determine their Volume using Vernier caliper.	2
3	2	CO 2	To determine Acceleration due to gravity by simple pendulum	2
4	3	CO 3	To determine coefficient of viscosity of liquid by Stokes' method	2
3	3	CO 3	To determine the surface tension of liquid using capillary rise method.	2
6	4	CO 4	To determine velocity of sound by resonance method.	2
7	5	CO 5	To determine refractive index by using pin method	2
8	1	CO 1	To measure the dimensions of given objects and to determine their Volume using micrometer screw gauge.	2
9	2	CO 2	To determine stiffness constant by using helical spring	2
10	3	CO 3	To determine the Young's modulus of elasticity of wire using Young's apparatus	2
11	3	CO 3	To verify the relation between radius of capillary tube and height of liquid in a capillary tube.	2
12	4	CO 4	To determine velocity of sound by using sonometer.	2
13	6	CO 5	Experiment on LASER	2
14	5	CO 5	To demonstrate spectrometer	2
15	ALL	CO 1	Showing Video on different applications related to units,	2
Total				30

Note: Experiments No. 1 to 10 are compulsory and should map all units and Cos. Remaining 5 experiments are to be performing on the importance of topic.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Applied Physics	Manikpure & Deshpande, S.Chand & Company	10:8121919541 13:9788121919548
2	Applied Physics	B.G.Bhandarkar, Vrinda Publication	0071779795
3	Optics & Optical Fibers	Brijlal Subhramanyan	978-3-662-52764-1
4	Engineering Physics	Gaur and S.L.Gupta S.Chand & Company	0-07-058502
5	Physics	Resnick and Halliday Tata McGraw Hills	978-0-07-1755487-3
6	Physics part I & II	H.C .Varma	9788177091878
7	Properties of Matter	D.S .Mathur	13: 978-8121908153

E-References:

1. www.physics.org
2. www.physicsclassroom.com
3. www.youtube.com/physics
4. www.ferrophysics.com
5. <http://hperphysics.phastr.gsu.edu/hbase/hph.htm>
6. www.sciencejoywagon.com/physicszone
7. <https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-physics>
8. MYCBSEGUIDE
9. <https://ndl.iitkgp.ac.in/>

CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	1	2	1	1	1	2	1	
CO2	3	--	1	---	1	1	1	2	1	1
CO3	3	1	1	---	1	1	1	1	1	
CO4	3	1	1	2	1	1	1	2	1	1

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	2	1	1	1	2	---
CO2	3	1	1	---	1	1	1	1	1
CO3	3	1	1	---	1	1	1	2	1
CO4	3	---	1	2	1	1	1	2	---

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/organization
1	Mr. Rajesh Masane	Sr. Engineer	L and T Mumbai
2	Mrs B.J. Choudhary	Lecturer in Physics	Govt. Polytechnic Thane
3	Mrs S.A. Thorat	Lecturer in Physics	Govt. Polytechnic Mumbai
4	Dr. D.S. Nikam	Lecturer in Physics	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Sci. & Humanities

Head of Departments
Department of Sci. & Humanities

I/C, Curriculum Development Cell

Principal

Programme : Diploma in CE/ME/CO/IF/EC/EE/IS(Sandwich Pattern)										
Course Code: SC19110				Course Title: ENGINEERING MATHEMATICS						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 Min.)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
4	--	--	4	60	20	20	--	--	--	100

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR- Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination Note: For Minimum passing marks under various heads, refer, examination rule AR26. Two practical skill tests are to be conducted. First skill test at midterm and second skill test at the end of the term

Rationale:

This subject is kept under the branch of sciences. This subject intends to teach student basic facts ,concepts, principles, and procedure of mathematics as a tool to analyze engineering problems and as such lays down foundation for understanding the engineering and core technology subject.

Course Outcomes: Student should be able to

CO1	Define the basic principles of function, limits, derivatives, complex number and relations between two variables.
CO2	Apply rules, concept and properties to solve the problems
CO3	Solve the given problems of integration using suitable method.

Course Content Details:

Unit No	Topics / Sub-topics
1	<p>1. Function</p> <p>1.1 Definition of variable, constant, intervals such as open, closed, semi-open etc</p> <p>1.2 Definition of function, value of function and types of functions and simple examples</p> <p>Course Outcome: CO1 Teaching Hours : 10 hrs Marks: 10 (R- 4, U-4, A-2)</p>
2	<p>2. Limits</p> <p>2.1 Definition of neighbourhood, concept and definition of limit</p> <p>2.2 Limits of Algebraic function</p> <p>2.3 Limits of Trigonometric Functions with simple examples</p> <p>Course Outcome: CO1 Teaching Hours : 10 hrs Marks: 10 (R- 2, U-4, A-4)</p>
3	<p>3. Derivatives & Application of derivative</p> <p>3.1 Definition of the derivative.</p> <p>3.2 Derivatives of standard function. (No proof by first principle)</p> <p>3.3 Differentiation of sum, difference, product and quotient of two or more functions</p> <p>3.4 Differentiation of composite function with simple example.</p> <p>3.5 Second order derivative.</p> <p>3.6 Geometrical Meaning of Derivative</p> <p>3.7 Tangents & Normals to the curve,</p> <p>3.8 Maxima & minima of the function</p> <p>3.9 Radius of curvature</p> <p>Course Outcome: CO2 Teaching Hours : 10 hrs Marks: 10 (R-4, U-4, A-2)</p>
4	<p>4. Integration & Application of integration</p> <p>4.1 Definition of integration as antiderivative, Integration of standard function</p> <p>4.2 Rules of integration (Integration of sum, difference, scalar multiplication) without proof</p> <p>4.3 Integration by substitution</p> <p>4.4 Integration of composite function</p> <p>4.5 Definition of definite integral</p> <p>4.6 Properties of definite integral with simple problems</p> <p>4.7 Area under the curve</p> <p>4.8 Area bounded by two curves</p> <p>Course Outcome: CO3 Teaching Hours : 10 hrs Marks: 10 (R-4, U-4, A-2)</p>
5	<p>5. Complex Number:-</p> <p>5.1 Definition of complex number Cartesian, Polar, Exponential form of complex number</p> <p>5.2 Algebra of complex number :- Equality, addition, Subtraction, Multiplication & Division with simple examples</p> <p>Course Outcome: CO2 Teaching Hours : 10 hrs Marks: 10 (R- 2, U-4, A-4)</p>
6	<p>6. Numerical Analysis</p> <p>6.1 Solution of Algebraic equations using –</p> <p>i) Bisectional method ii) Regular – Falsi method ,</p> <p>iii) Newton- Raphson method</p> <p>6.2 Solution of simultaneous equation</p> <p>(i) Gauss elimination method</p> <p>(ii) Jacobi's method (iii) Gauss-Seidal method</p> <p>Course Outcome: CO2 Teaching Hours : 10 hrs Marks: 10 (R- 2, U-4, A-4)</p>

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Function	04	04	02	10
2	Limits	02	04	04	10
3	Derivatives & Application of Derivatives	04	04	02	10
4	Integration & Application of Integration	04	04	02	10
5	Complex Number	02	04	04	10
6	Numerical Analysis	02	04	04	10
Total		18	24	18	60

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Mathematics for Polytechnic Students	S.P.Deshpande, Pune Vidyavardhini Graha Prakashan	-
2	Mathematics for Polytechnic Students (Volume I)	H.K.Dass, S.Chand Prakashan	9788121935241
3	Companions to Basic Maths	G.V.Kumbhojkar, Phadke Prakashan	10-B07951HJDQ 13-B07951HJDQ
4	Applied Mathematics	N.Raghvendra Bhatt late, Tata McGraw Hill Publication Shri R Mohan Singh	9789339219567, 9339219562

E-References:

1. www.math-magic.com
2. www.Scilab.org/-SCI Lab
3. www.mathworks.com/Products/Matlab/-MATLAB
4. www.wolfram.com/mathematica/-Mathematica
5. <https://www.khanaacademy.org/math?gclid=CNqHuabCys4CFdoJaAoddHoPig>
6. www.dplot.com/-Dplot
7. www.allmathcad.com/-Math CAD
8. www.easycalculation.com
9. <https://www.vedantu.com/ncert-solutions/ncert-solutions-class-12-maths>
10. MYCBSEGUIDE

CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1		1
CO2	3			1			1	1		1
CO3	3			1			1	1		1

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3			1			1	1	
CO2	3			1			1	1	
CO3	3			1			1	1	

CO Vs PO and CO Vs PSO Mapping (COMPUTER ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1	1	
CO2	3			1			1	1	1	
CO3	3			1			1	1	1	

CO Vs PO and CO Vs PSO Mapping (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1	1		1
CO2	3			1			1	1		1
CO3	3			1			1	1		1

CO Vs PO and CO Vs PSO Mapping (ELCTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1		1	1
CO2	3			1			1		1	1
CO3	3			1			1		1	1

CO Vs PO and CO Vs PSO Mapping (ELECTRICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3			1			1		1	
CO2	3			1			1		1	
CO3	3			1			1		1	

CO Vs PO and CO Vs PSO Mapping (INSTRUMENTATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3			1			1	1	1
CO2	3			1			1	1	1
CO3	3			1			1	1	1

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Neelamkumar R. Sawant	State Head Technical Services for (Maharashtra and Goa)	JSW Cement Ltd. Mumbai Head Office
2	Mrs. Deepawali S. kaware	Lecturer in Mathematics	Government polytechnic Vikaramgad
3	Mr. A.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai
4	Mr. V.S.Patil	Lecturer in Mathematics	Government polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Sci. & Humanities

Head of Departments
Department of Science & Humanities

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Civil Engineering (Sandwich Pattern)										
Course Code: CE19201				Course Title: BUILDING DRAWING						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
1	4	--	5	--	--	--	50*	--	50	100

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR- Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
 Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale:

Drawing is a universal language of Engineers. It is the language through which Engineers can communicate with skilled, semiskilled and unskilled labours. The students have to use this subject to develop ability to read, understand and prepare drawings, to use it for different subjects during diploma course. Student will be taught to draw building structures and its various parts using conventions and symbols as per IS 962. Civil Engineer has to convert design parameters, process details into pictorial views. Therefore it is required to understand and prepare the drawings and interpret the drawings, so that, the work can be executed. Civil engineer should be competent to convert his ideas into the drawing. Drawings are essential for drafting specifications and tender documents. The knowledge of this course is useful for construction technology, estimating and costing, design of structure, surveying, and projects.

Course Outcomes: Student will

CO1	Interpret and Draw the conventions, signs and symbols.
CO2	Know and apply basic rules & bylaws governing the planning of building and calculate different areas such as plinth area, floor area, built-up area, carpet area.
CO3	Know the different agencies involved in building construction works.
CO4	Draw line plan, developed plan, elevation, section, site plan, location plan and foundation plan and measured drawing of residential building.
CO5	Draw line plans of public building.
CO6	Draw perspective drawing of object.

Course Content Details:

Unit No	Topics / Sub-topics
1	Introduction : 1.1 Purpose of drawing, primary requirements of good drawing. Conventions as per IS 962:1989.

	<p>1.2 Symbols for different materials such as earthwork, brickwork, stonework, concrete, woodwork etc. used in civil engineering construction, graphical symbols for door and window, Abbreviations, symbols for sanitary and electrical installations.</p> <p>1.3 Types of lines- visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots, Appropriate lettering and numbering.</p> <p>1.4 Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing</p> <p>Course Outcome: CO1 Teaching Hours : 2 hrs Marks: 04 (R- 4, U-0, A-0)</p>
2	<p>Principles of Planning :</p> <p>2.1 Principles of Planning of building : aspect, prospect, orientation, privacy, circulation, grouping, roominess, furniture requirements, sanitation, elegance, economy.</p> <p>2.2 Space requirement and norms for minimum dimension of different units in the residential and public buildings.</p> <p>2.3 Rules and building bylaws of plan sanctioning authority for residential and public building regarding plot area, built up area, super built up area, plinth area, carpet area, floor area, FAR (Floor Area Ratio) / FSI, RERA Carpet Area, Volume plot ratio.</p> <p>Course Outcome: CO2 Teaching Hours : 3 hrs Marks:08 (R- 4 , U-4 , A-0)</p>
3	<p>Agencies in Building Construction work :</p> <p>3.1 Functions of different agencies involved in construction work such as owner, Project Manager, Geotechnical Engineer, Architects, Structural Engineer, Contractor, Promoter, Quantity surveyor, Supervisor, HVAC services, Arbitrator, Safety Engineer, QA/QC team, Third party Audit.</p> <p>Course Outcome: CO3 Teaching Hours : 1 hrs Marks: 04 (R- 4, U-0, A-0)</p>
4	<p>Residential building :</p> <p>4.1 Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning.</p> <p>4.2 Development of line plan, drawing of plan, elevation, sections, site plan, location plan, Block Plan, foundation plan, preparing schedule of openings, construction notes, Area statement. Global Co-ordinates, Bench mark</p> <p>4.3 Measured drawing, Submission drawing and working drawing and its significance.</p> <p>Course Outcome: CO4 Teaching Hours : 4 hrs Marks:14 (R- 0 , U- 10 , A-14)</p>
5	<p>Public Building :</p> <p>5.1 Data required for planning public building such as Library, community centre, post office, high school, primary health centre, market, hospital, bank, hostel, Bus Depot.</p> <p>5.2 Line plans for public building: school building, primary health centre, hospital building, bank, post office, hostel, canteen, Restaurant, Industrial building with monitor roof, Ware house.</p> <p>Course Outcome: CO5 Teaching Hours : 3 hrs Marks:10 (R- 0 , U- 2 , A-8)</p>

6	<p>Perspective Drawing : 6.1 Definition, Types of perspective, terms used in perspective drawing, principles used in perspective drawing. 6.2 One Point and Two Point Perspective of small objects such as steps, monuments, pedestals, Concept of Bird's Eyeview. Course Outcome: CO6 Teaching Hours : 2 hrs Marks:10 (R- 0 , U- 4 , A-6)</p>
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Suggested Specifications Table (Practical):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	04	--	--	04
2	Principles of Planning	04	04	--	08
3	Agencies in Building Construction work	04	--	--	04
4	Residential building	--	04	10	14
5	Public Building	--	02	08	10
6	Perspective Drawing	--	04	06	10
Total		12	14	24	50

List of experiments:

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	Draw various types of lines, Legends-graphical symbols for materials, doors, windows, sanitary and water supply installations, electrical installations, abbreviations as per IS 962:1989 (on A3 paper)	08
2	2	CO2	Assignment on Principles of planning	04
3	3	CO3	Visit to Construction sites and write assignment on Agencies involved in Building Construction work	04
4	4	CO4	Submission drawing, to the scale 1:100, of (G+1) Residential Building Framed Structure (2 BHK with attached toilet to 1 bedroom showing the position of European type WC pan) showing developed plan, elevation, section passing through staircase, site plan (1:200), foundation plan (1:50), area statement, schedule of openings, Construction Notes, Reference Note, Revision History and Cloud marks.(on A1 paper)	12
5	4	CO4	Measured Drawing of small residential building or flat with minimum two rooms, kitchen, sanitary block consisting of plan, elevation, section, opening schedule, site plan, construction notes. .(on A1 paper)	12
6	5	CO5	To draw line plans of at least five public buildings, Industrial	10

			buildings on A3 paper. (Visit to Public building to be arranged.)	
7	5	CO5	Visit to Pre-Engineered Building.	04
8	6	CO6	One point and Two Point Perspective Drawing of small objects - steps, monuments, pedestals (any one) scale 1:50. (on A1 paper)	06
Total				60

Note: All Experiments are compulsory.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Building Drawing	Shah, Kale, Patki, Tata McGraw Hill, New Delhi	0-07-460378-7
2	Planning and Design of building	Y.S.Sane, Allies bookstall Poona – 4 & Engineering Book publishers, Company Pune - 16.	ASIN B0007JVH92
3	Civil Engineering Drawing	Malik & Mayo, New Asian Publishers, Nai Sadak, New Delhi - 6	978-8173180026
4	IS code 962:1989		

E-References:

1. <https://ndl.iitkgp.ac.in/>
2. www.google.com
3. www.youtube/
4. <http://www.nationallibrary.gov.in>

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	--	--	3	3	3	3	3	1
CO2	3	3	3	--	3	3	3	1	3	1
CO3	2	1	2	--	3	3	3	1	2	--
CO4	3	1	1	--	3	3	3	3	3	1
CO5	3	1	1	--	2	3	3	3	2	1
CO6	3	1	--	--	2	1	3	3	1	--

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Shivkumar Aade	Deputy Chief Engineer	MHADA
2	Mr. Sharad Sonawane	Director	Om Ajay Constructions
3	Mr. K.V. Kelgandre	Sr. Lecturer	K.J. Somaiya Polytechnic
4	Ms. S.M. Male	Lecturer	G.P. Mumbai

Coordinator,
Curriculum Development,
Department of Civil Engineering

Head of Department
Department of Civil Engineering

I/C, Curriculum Development Cell

Principal



Programme : Diploma in Civil Engineering (Sandwich Pattern)										
Course Code: CE19202				Course Title: Surveying-I						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2 Hrs 30 min)	TS1 (1 Hr)	TS2 (1Hr)	PR	OR	TW	Total
03	04	--	07	60	20	20	50*	--	50	200

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR- Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
 Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale:

Development and planning process for any civil engineering project needs survey of that area to be carried out and various types of survey maps are to be prepared. These maps and drawing are used for taking various decisions regarding the planning, designing, estimation, execution and construction process. The diploma pass outs/technicians should therefore know the various methods and instruments required for surveying. They should also have the skill and information to handle and operate the needed survey instruments. This course is therefore one of the core courses required for Civil Engineers.

Course Outcomes: Student should be able to

CO1	Select the type of survey required for given situation.
CO2	Compute area of open field using chain, tape and cross staff.
CO3	Conduct traversing in the field using chain and compass.
CO4	Use plane Table to prepare plans.
CO5	Use leveling instruments to determine reduced level of ground points.
CO6	Draw/interpret contour maps of an area collecting field data.

Course Content Details:

Unit No	Topics / Sub-topics
1	Introduction. 1.1 Definition of Surveying, Object of Surveying, Purpose and Uses of Surveying 1.2 Classification of surveying- Primary and Secondary classification 1.3 Principles of Survey Course Outcome: CO1 Teaching Hours :3 hrs Marks: 04 (R- 2, U-2, A- 0)
2	Chain And Cross Staff Survey 2.1 Principle of Chain Surveying, Well Conditioned and Ill-Conditioned Triangles 2.2 Instruments used in chain survey - Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Offset rod, Open cross staff, optical square Principle of optical square 2.3 Selection of survey station, Subsidiary station, Tie station, Base line, Check line, Tie

	<p>line, Offset- Perpendicular and Oblique</p> <p>2.4 Location Sketch of survey station and running measurements of building</p> <p>2.5 Conventional symbols, recording of measurements in a field book.</p> <p>2.6 Ranging: Direct Ranging and Indirect Ranging</p> <p>Course Outcome: CO2 Teaching Hours :8 hrs Marks:10 (R-2 , U- 4 , A- 4)</p>
3	<p>Chain and Compass traverse Survey</p> <p>3.1 Principle of compass survey, Traversing- closed traverse, open traverse</p> <p>3.2 Technical Terms: True, Magnetic and Arbitrary Meridians and Bearings, Fore Bearing and Back Bearing, Whole Circle Bearing System and Reduced Bearing System, Examples on conversion of WCB in to RB and vice versa, Calculation of internal and external angles from bearings at a station. Dip of Magnetic needle, Magnetic Declination.</p> <p>3.3 Components of Prismatic Compass and their Functions, Method of using Prismatic Compass- temporary adjustments and observing bearings</p> <p>3.4 Local attraction, Methods of correction of observed bearings-Correction at station and correction to included angles,</p> <p>3.5 Methods of plotting a traverse and closing error, Graphical adjustment of closing error.</p> <p>Course Outcome:CO3 Teaching Hours :12 hrs Marks:14 (R- 2, U- 6 , A- 6)</p>
4	<p>Plane Table Survey</p> <p>4.1 Principle of plane table survey.</p> <p>4.2 Accessories of plane table and their use, Telescopic alidade.</p> <p>4.3 Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method.</p> <p>4.4 Methods of plane table surveys- Radiation, Intersection and Traversing. Merits and demerits of plane table survey.</p> <p>Course Outcome:CO4 Teaching Hours :5 hrs Marks:08 (R-4 , U-4, A- --)</p>
5	<p>Levelling</p> <p>5.1 Definitions: Levelling, Level surface, Level line, Horizontal plane, Horizontal line, Vertical line and vertical plane, Datum surface, Reduced Level, Line of collimation, Axis of telescope, Axis of bubble tube, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Back sight, Fore sight, intermediate sight, Change point, Height of instruments .</p> <p>5.2 Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes. Temporary adjustments of Dumpy and Auto Level.</p> <p>5.3 Types of Levelling: Simple, Differential, Fly, Profile and Reciprocal Levelling</p> <p>5.4 Types of Levelling Staffs: Self-reading staff and Target staff.</p> <p>5.5 Reduction of level by Line of collimation method and Rise/ Fall Method</p> <p>5.6 Numerical examples to find the R. L. by H.I.Method and Rise and Fall Method with necessary checks</p> <p>5.7 Errors in Levelling</p> <p>Course Outcome:CO5 Teaching Hours :12 hrs Marks:16 (R- 4 , U- 4 , A-8)</p>
6	<p>Contouring</p> <p>6.1 Definitions: Contour, contour interval, horizontal equivalent.</p> <p>6.2 Uses of contour maps, Characteristics of contours, methods of Contouring: Direct and</p>

indirect 6.3 Interpolation of contours by Approximate method and Arithmetic method. Course Outcome:CO6 Teaching Hours :5 hrs Marks:08 (R- 2 , U- 4 , A- 2)
--

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	2	2	--	04
2	Chain And Cross Staff Survey	2	4	4	10
3	Chain and Compass traverse Survey	2	6	6	14
4	Plane Table Survey	4	4	--	08
5	Levelling	4	4	8	16
6	Contouring	2	4	2	08
Total		16	24	20	60

List of experiments:

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	1	CO1	Select the type of survey to measure distance between two points in the field.	2
2	2	CO2	Determine area of open field using chain & cross staff survey	2
3	3	CO3	Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.	2
4	4	CO4	Use Plane Table Survey to prepare plans of a 5 sided closed traverse by Radiation Method.	2
5	5	CO5	Undertake simple leveling using dumpy level/ Auto level and leveling staff and find reduced levels of ground points and bottom of chajja/slab.	2
6	6	CO6	Conduct block contouring for the area of 40m x 40m and grid 10m x 10m to draw its contour plan.	4
7	3	CO3	Measure Fore Bearing and back bearing of a closed traverse of 5or 6 sides and correct the bearings and included angles for the local attraction	4
8	4	CO4	Use plane table survey to prepare plans locate details by Traversing Method	2
9	5	CO5	Undertake differential leveling and determine Reduced Levels by Height of Instrument method and Rise and Fall method using dumpy /auto level and leveling staff.	4
10	3	CO3	Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides (Compulsory)	1 Full Day (8 hrs)

11	3	CO3	Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical no.10	4
12	5	CO5	Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval. (Compulsory) .	1 Full Day (8 hrs)
13	5	CO5	Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical no.12	4
14	6	CO6	Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m. (Compulsory)	1 Full Day (8 hrs)
15	6	CO6	Plot the contours on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical no.14	4
Total				60

Note: All experiments are compulsory.

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Surveying and Levelling	N. N. Basak Tata McGraw Hill Education Private Ltd. New Delhi , 33 rd reprint2010	ISBN 93-3290-153-8
2	Surveying and Levelling volume I	Kanetkar, T. P.; Kulkarni, S. V. Pune Vidyarthi Gruh Prakashan	ISBN 978-81-858-2511-3
3	Survey I	Duggal, S. K. McGraw Hill Education Private Ltd. New Delhi,	ISBN 978-00-701-5137-6
4	Surveying I	Punmia B.C., Jain Ashok Kumar; Jain Arun Kumar Laxmi Publications., New Delhi.	ISBN: 8-17-008853-4

E-References:

- <http://www.asnu.com.au>
- www.oupinheonline.com
- <http://www.mtu.edu/technology/undergrad>
- <http://www.wb.psu.edu/Academics/Degrees>
- <http://www.tjc.edu/info/2004134/profess>
- <http://www.pstcc.edu/catalog/12-13/cerp>
- https://youtu.be/e_yabRh5GY
- <https://youtu.be/Z4yYHHX8N0>
- <https://youtu.be/2hL4wWUUSFc>
- <https://youtu.be/j8poe2vvD2Q>
- https://youtu.be/chhuq_t40rY
- <https://youtu.be/L54T4uvpMTg>
- <https://youtu.be/NdNEy-HBsoA>
- <https://youtu.be/7dN3Iku0Bns>
- <http://www.nationallibrary.gov.in>

CO Vs PO and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	3	2	2	2	3
CO2	3	3	3	3	2	2	2	2	2	3
CO3	3	3	2	3	2	3	2	2	2	3
CO4	3	3	3	3	2	3	2	2	2	3
CO5	3	3	3	3	2	3	2	2	2	3
CO6	3	2	3	3	2	3	2	2	2	2

Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Mr. Rohan Deokar	Deputy Engineer	MMRDA
2	Mr. Sanjay Kulkarni	Surveyor and Consultant	SRKulkarni Pvt.Firm
3	Mr. K.V. Kelgandre	Sr. Lecturer in Civil Engg.	K.J. Somaiya Polytechnic
4	Mr. D. K. Fad	Sr. Lecturer in Civil Engg.	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of Civil Engg.

Head of Department
Department of Civil Engg.

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Civil Engineering & Mechanical Engineering (Sandwich Pattern)										
Course Code:AM19201				Course Title: Engineering Mechanics						
Compulsory / Optional: Compulsory										
Teaching Scheme and Credits				Examination Scheme						
L	P	TU	Total	TH (2Hrs 30min)	TS1 (1Hr)	TS2 (1Hr)	PR	OR	TW	Total
03	02	--	05	60	20	20	25	--	25	150

Abbreviations: L- Theory Lecture, P-Practical, TU-Tutorial, TH- Theory Paper TS1 & TS2- Term Tests, PR- Practical, OR-Oral, TW: Term Work (progressive assessment) , * Indicates assessment by External Examiner else internal practical skill test , # indicates Self, on- line learning Mode, @ indicates on line examination
 Note: For Minimum passing marks under various heads, refer, examination rule AR 26. Two practical skill test are to be conducted. First skill test at mid term and second skill test at the end of the term

Rationale :

In day to day life we come across different structures, at the time of design of structures, analysis plays an important role. Perfect analysis is possible only when one knows the types and effect of forces acting on the structure. This course provides knowledge about the different types of forces/loads, their effects while acting in different conditions/systems. The course also provides the knowledge about basic concepts of laws of engineering, their application to different engineering problem. The principles of mechanics are fundamental to Mechanical and Civil Engineering and related programs such as Mechatronic Engineering, Naval Architecture, Aerospace, Manufacturing as well as Biomedical engineering. This course is needed as a prerequisite for the courses at higher level such as Mechanics of Structures, Strength of Materials, Design of Structures, Theory of Machines, etc.

Course Outcomes: Student should be able to

CO1	Apply principles of simple machines.
CO2	Determine unknown forces of various force system.
CO3	Apply the principles of equilibrium to engineering problems.
CO4	Apply the principle of friction in various conditions.
CO5	Calculate centroid and center of gravity for various geometrical figures.
CO6	Apply the principles of dynamics.

Course Content Details:

Unit No	Topics / Sub-topics
1	Simple Machines: 1.1 Definitions 1.2 Simple machine, compound machine , load , effort , mechanical advantage , velocity ratio , input of a machine ,output of a machine efficiency of a machine , ideal machine,

	<p>ideal effort and ideal load, load lost in friction, effort lost in friction</p> <p>1.3 Analysis: Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self-locking machine, simple numerical problems.</p> <p>1.4 Velocity Ratio for simple machines :</p> <p>Simple axle and wheel, differential axle and wheel, Weston's differential pulley block, single purchase crab, double purchase crab, worm and worm wheel, geared pulley block, screw jack, calculation of mechanical advantage, efficiency, identification of type such as Reversible or not etc.</p> <p>Course Outcome: CO1 Teaching Hours : 6 hrs Marks: 12 (R- 2, U-4, A-6)</p>
2	<p>Force systems:</p> <p>2.1 Fundamentals and Force systems: Definitions engineering 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, Definition of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a force, principle of transmissibility.</p> <p>2.2 Resolution of a force and Moment of a force: Definition, Method of resolution, along mutually perpendicular direction and along two given direction. Definition of moment, classification of moments, sign convention, law of moments, Varignon's theorem of moment and its use, definition of couple, properties of couple</p> <p>2.3 Composition & resolution of forces : Definition of Resultant force, methods of composition of forces, Law of parallelogram of forces, Algebraic method for determination of resultant for various force system.</p> <p>2.4 Graphical method: Space diagram, vector diagram, polar diagram, and funicular polygon. Resultant of concurrent and parallel force system only.</p> <p>Course Outcome: CO2 Teaching Hours: 10 hrs Marks: 12 (R -4, U- 4, A- 4)</p>
3	<p>Equilibrium:</p> <p>3.1 Equilibrant and Lami's Theorem: Definition of equilibrant, relation between resultant and equilibrant, equilibrant of concurrent and non-concurrent force system. Analytical, free body and free body diagram. Statement and explanation of Lami's theorem and Application.</p> <p>3.2 Beams: 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 simply supported, cantilever and over hanging beam subjected to point loads and UDL and graphical method to determine reactions for beams subjected to vertical point loads & UDL only</p> <p>Course Outcome: CO3 Teaching Hours:8 hrs Marks: 10 (R- 2, U- 4, A- 4)</p>

4	<p>Friction: 4.1 Definition: Friction, Types of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction, angle of repose and coefficient of friction. Cone of friction, advantages and disadvantages of friction.</p> <p>4.2 Equilibrium of body on Horizontal and inclined plane: 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. Concept of ladder friction.</p> <p>4.3 Introduction (only) - Dynamic friction</p> <p>Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 10 (R- 2 ,U- 4, A- 4)</p>
5	<p>Centroid and Centre Of Gravity: 5.1 Centroid: 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 three geometrical figures.</p> <p>5.2 Center of gravity: Definition, center of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids with not more than Two simple solids. (Hollow solids are expected.)</p> <p>Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 10 (R- 2, U- 2, A- 6)</p>
6	<p>Dynamics : 6.1 Kinetics : Definition of kinetics, Newton's laws of motion and its applications. 6.2 Kinematics : Definition of kinematics, Basic concepts of motion, rectilinear motion, displacement, velocity, speed, acceleration. 6.3 Angular motion : Introduction, definition of angular velocity, angular acceleration, angular displacement, (Simple Numericals) 6.4 Motion under gravity. (No numerical on this subtopic)</p> <p>Course Outcome: CO6 Teaching Hours: 5 hrs Marks: 6 (R-2, U- 0, A- 4)</p>

Suggested Specifications Table (Theory):

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Simple Machines	2	4	6	12
2	Force Systems	4	4	4	12
3	Equilibrium	2	4	4	10
4	Friction	2	4	4	10
5	Centroid and Centre Of Gravity	2	2	6	10
6	Dynamics	2	--	4	6
Total		14	18	28	60

List of experiments:

Sr. No.	Unit No	COs	Title of the Experiments	Hours
1	01	CO1	To determine MA, VR, Efficiency, Ideal Effort, Effort lost in friction for Differential axle & wheel and for Simple screw jack.	02
2	01	CO1	To determine MA, VR, Efficiency, Ideal Effort, Effort lost in friction for single purchase crab and for double purchase crab.	02
3	02	CO2	Verify law of polygon of forces	02
4	02	CO2	Graphically determine resultant of concurrent and non-concurrent force system.	04
5	02	CO2	Graphically determine resultant of parallel force system.	02
6	02	CO2	To verify law of moments.	02
7	03	CO3	To verify of Lami's theorem	02
8	03	CO3	To verify the Equilibrium of parallel forces – simply supported beam reactions	02
9	04	CO4	To determine coefficient of friction for motion on horizontal plane.	04
10	05	CO5	Determination of Centroid of basic geometrical figures such as square, rectangle, triangle, circle & Centre of gravity of simple solids such as cylinder, sphere, cone, cube.	04
11	06	CO6	Numericals on Angular motion	04
		Total		30

Note: All experiments are compulsory

References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	Engineering Mechanics	R.S.Khurmi, S. Chand & Company Ltd.	10-9352833961
2	Engineering Mechanics	Shames and Rao, Pearson Education.	13-978-0133569087
3	Engineering Mechanics	R.C.Hibbeler, Pearson Education.	13-978-0133073577
4	Applied Mechanics	S. Ramamruthum, Dhanpat Rai & Sones, Delhi.	10-935216427X

E-References:

1. support@swayam.gov.in
2. arunasis@iitg.ernet.in
3. www.google.com
4. www.youtube.com
5. <http://www.nationallibrary.gov.in>

CO Vs PO and CO Vs PSO Mapping (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	2	2	3	2	--
CO2	3	3	3	2	1	1	2	3	--	--
CO3	3	3	3	2	1	1	2	3	--	--
CO4	3	3	3	2	1	1	2	3	--	--
CO5	3	3	3	2	1	1	2	3	--	--
CO6	3	3	3	2	1	1	2	3	--	--

CO Vs PO and CO Vs PSO Mapping (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	3	2	1	2	2	3	2
CO2	3	3	3	2	1	1	2	3	3
CO3	3	3	3	2	1	1	2	3	3
CO4	3	3	3	2	1	1	2	3	3
CO5	3	3	3	2	1	1	2	3	3
CO6	3	3	3	2	1	1	2	3	3

Industry Consultation Committee:

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5	Smt Ashwini Hagawane	Lecturer in Mechanical Engineering	G.P.Mumbai

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Principal

CE 19203 Libre Office Draw

1. Promo of LibreOffice Suite (Foss: *LibreOffice Suite Draw – English*)

Outline: LibreOffice promo - Features of LibreOffice - Uses of LibreOffice - LibreOffice formats - LibreOffice tutorials in Spoken Tutorial - Applications of LibreOffice - LibreOffi.

2. Introduction

Outline: Introduction to LibreOffice Draw LibreOffice Draw Create and save an Impress Draw file LibreOffice Draw Workspace Graphics - Bitmap or raster image - Vector graphics.

3. Create simple drawings

Outline: Create simple drawings Basic shapes (lines, arrows, rectangles and squares, circles) (How to improve upon a water cycle diagram by adding shapes and so on.) Geometric shapes (basic..

4. Basics of working with objects

Outline: Basics of working with objects Cut, copy, paste objects Resize objects dynamically using handles Object Arrangement Adding a new page to a file Group and ungroup objects Edit.

5. Fill objects with color

Outline: Fill objects with color, gradients, hatching and bitmaps Making outlines invisible Adding a shadow to the objects Creating new colors How to import a bitmap into Draw. Set...

6. Insert text in drawings

Outline: Insert text in drawings Insert text directly inside an object Changing the text color Working with text boxes and formatting text in objects Making the line wider. Set prefere..

7. Common editing and print functions

Outline: Common editing and print functions Set the draw page for page size and margins Paper size, page count, page numbers, date, and time Undo and redo actions Rename a page Print a..

8. Polygons and Curves

Outline: Curves and Polygons Various types of Polygons Draw directions using arrows Flow charts Insert tables and graphs Page Margins and Orientation Font Type and Size modification ..

9. Edit Curves and Polygons

Outline: Use the Edit Points toolbar Insert new points Move existing points Using control lines to change the shape of the objects Group the objects together

10. Flow Charts Connectors Glue Points

Outline: Draw Flowcharts To Draw Beizer curve Insert text in flow charts Various text insertion options -Resizing shape to fit text width -Word wrap text in shape What is Flowcha..

11. Working with Objects

Outline: What are Grids? What are Guides? What are Snap Lines? Position objects with grids, guides and snap lines Resize objects exactly and duplicate objects Distribute objects ..

12. Import and Export Images

Outline: Import images into a Draw page *as a link * as an embedded image Edit Links Remove links Automatic embedding of images Delete the picture Export the whole Draw file or one ..

13. Basics of Layers Password Encryption PDF

Outline: Basics-of-Layers-Password-Encryption-PDF Layers -Layout -Controls -Dimensions How to protect a Draw file Using password encryption Export it as..

14. Working with 3D objects

Outline: Enable the grids and the guide lines How to create 3D objects Extrusion(Creating 3D objects, using 2D objects) 3D Toolbar 3D Rotation Object Typing text in 3D objects using Te..

15. Set Draw preferences

Outline: Learn how to set the following preferences: **Properties **Create versions **View in color/grayscale/black-and-white Setting Title, Subject, Keywords and Comments of a file..