 <b>MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI</b> <b>TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES</b>																		
<b>COURSE NAME : MECHANICAL ENGINEERING GROUP</b>																		
<b>COURSE CODE : MC</b>																		
<b>DURATION OF COURSE : 8 SEMESTERS</b>												<b>WITH EFFECT FROM 2013-14</b>						
<b>SEMESTER : SECOND</b>																		
<b>DURATION : 15 DAYS SESSION</b>																		
<b>PATTERN : CORRESPONDENCE - SEMESTER</b>												<b>SCHEME : G</b>						
SR. NO	SUBJECT TITLE		Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17200)	
					TH	Test	PR	PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min			
1	Communication Skills \$		CMS	17916	05	01	16	03	100	40	--	--	25#	10	25@	10		
2	Engineering Mathematics \$		EMS	17917	09	01	--	03	100	40	--	--	--	--	--	--		
3*	Applied Science	Physics	APH	17921	06	01	20+2*	02	50	100	40	25@	50	20	--	--	--	--
		Chemistry	ACH	17922	06	01	20+2*	02	50			25@			--	--	--	--
4	Engineering Drawing		EDG	17923	05	01	24	04	100	40	--	--	--	--	25@	10		
<b>TOTAL</b>					<b>32</b>	<b>04</b>	<b>84</b>	<b>--</b>	<b>400</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>50</b>	<b>--</b>	<b>50</b>	<b>--</b>

Total Contact Hours During resident session Per Week: **120 Hrs.** (15 days\* 8 hours per day)  
**THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.**  
**Total Marks : 600**  
 @ - Internal Assessment, # - External Assessment,  No Theory Examination, \$ - Common to all branches, β – Common to CE, ME, EE and CH Groups  
 Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

- Conduct One class test of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

\* Applied Science is divided into two parts - Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.

\* **Candidate remaining absent in examination of any one part of Applied Science subject i.e. Physics, Chemistry will be declare as Absent in Mark List and has to appear for examination. The marks of the part for which candidate was present will not be processed or carried forward.**

**Course Name : All Branches of Diploma in Engineering & Technology**

**Course Code : CC/EC/MC/XC/GC**

Semester : Second

**Subject Title : Communication Skills**

**Subject Code : 17916**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TEST	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
05	01	16	03	100	--	25#	25@	150

**NOTE:**

- One tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

**Rationale:**

In this age of globalization, competition is tough. Hence effective communication skills are important. Communication skills play a vital and decisive role in career development. The subject of Communication Skills introduces basic concepts of communication. It also describes the verbal, non-verbal modes and techniques of oral & written communication.

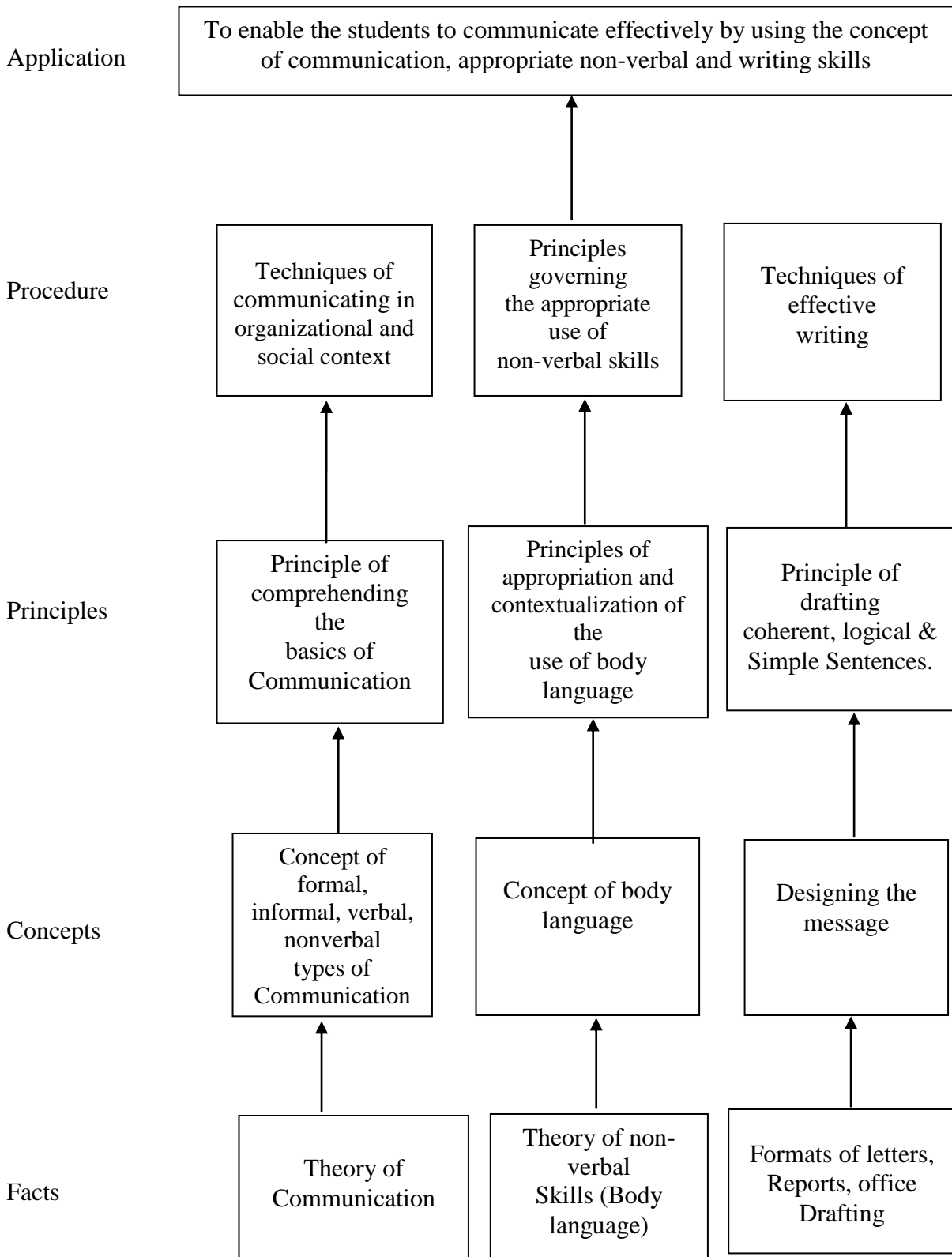
It will guide and direct to develop a good personality and improve communication skills.

**General Objectives:**

Students will be able to:

1. Utilize the skills necessary to be a competent communicator.
2. Select and apply the appropriate methods of communication in various situations.

**Learning Structure:**



## Theory

Name of the Topic	Hours	Marks
<p><b>Topic 01 - Introduction to Communication:</b></p> <p><b>Specific Objective:</b></p> <ul style="list-style-type: none"> <li>➤ Describe the process of communication.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition of communication</li> <li>• Process of communication</li> <li>• Types of communication -- Formal, Informal, Verbal, Nonverbal, Vertical, Horizontal, Diagonal</li> </ul>	<b>06</b>	<b>16</b>
<p><b>Topic 02 - Effective communication</b></p> <p><b>Specific Objective:</b></p> <ul style="list-style-type: none"> <li>➤ Identify the principles and barriers in the communication process</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>❖ Principles of communication.</li> <li>❖ Barriers to communication</li> <li>a. <b>Physical Barrier:</b> <ul style="list-style-type: none"> <li>❖ Environmental ( time, noise, distance &amp; surroundings),</li> <li>❖ Personal (deafness, stammering, ill-health, spastic, bad handwriting)</li> </ul> </li> <li>b. <b>Mechanical :</b> Machine oriented</li> <li>c. <b>Psychological:</b> Day dreaming, prejudice, emotions, blocked mind, generation gap, phobia, status inattentiveness, perception.</li> <li>d. <b>Language :</b> Difference in language, technical jargons, pronunciation &amp; allusions.</li> </ul>	<b>08</b>	<b>20</b>
<p><b>Topic 03 - Non verbal &amp; Graphical communication:</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Effective use of body language &amp; nonverbal codes</li> <li>➤ View and interpret graphical information precisely.</li> </ul> <p><b>Contents:</b></p> <p>3.1 Non- verbal codes: [08 Marks]</p> <ul style="list-style-type: none"> <li>• Proxemics,</li> <li>• Chronemics</li> <li>• Artefacts</li> </ul> <p>3.2 Aspects of body language ( Kinesics) [10 Marks]</p> <ul style="list-style-type: none"> <li>• Facial expression</li> <li>• Eye contact</li> <li>• Vocalics, paralanguage</li> <li>• Gesture</li> <li>• Posture</li> <li>• Dress &amp; appearance</li> </ul>	<b>08</b>	<b>28</b>

<ul style="list-style-type: none"> <li>• Haptics</li> </ul> 3.3 Graphical communication [10 Marks] <ul style="list-style-type: none"> <li>• Advantages &amp; disadvantages of graphical communication</li> <li>• Tabulation of data &amp; its depiction in the form of bar graphs &amp; pie charts.</li> </ul>		
<b>Topic 04 - Listening</b> <b>Specific Objective:</b> <ul style="list-style-type: none"> <li>➤ Effective use of listening</li> </ul> <b>Contents:</b> <ul style="list-style-type: none"> <li>• Introduction to listening</li> <li>• Listening versus hearing</li> <li>• Merits of good listening</li> <li>• Types of listening.</li> <li>• Techniques of effective listening.</li> </ul>	<b>02</b>	<b>08</b>
<b>Topic 05 - Formal Written Communication</b> <b>Specific Objectives:</b> <ul style="list-style-type: none"> <li>➤ Use different formats of formal written skills.</li> </ul> <b>Contents:</b> <ul style="list-style-type: none"> <li>• Office Drafting: Notice , memo &amp; e-mail</li> <li>• Job application with resume.</li> <li>• Business correspondence: Enquiry letter, order letter ,complaint letter, adjustment letter.</li> <li>• Report writing: Accident report, fall in production, investigation report.</li> <li>• Describing objects &amp; giving instructions</li> </ul>	<b>08</b>	<b>28</b>
	<b>32</b>	<b>100</b>

### Skills to be developed in practical:

#### Intellectual Skills:

1. Analyzing given situation.
2. Expressing thoughts in proper language.

#### Motor Skills:

1. Presentation Skills focusing on body language.
2. Interpersonal skills of communication

#### Journal will consist of following assignments:

01: Draw the diagram of communication cycle for given situation.

State the type and elements of communication involved in it.

- 02: Graphics:-
- a) Draw suitable bar-graph using the given data.
  - b) Draw suitable pie-chart using the given data.

03: Role play: Teacher should form the group of students based on no. of characters in the situation. Students should develop the conversation and act out their roles.

04: Collect five pictures depicting aspects of body language from different sources such as magazines, newspapers, internet etc. State the type and meaning of the pictures.

**NOTE: The following assignments should be performed by using Language Software.**

05 Practice conversations with the help of software.

06 Describe people/personalities with the help of software and present in front of your batch.

07 Prepare and present elocution (three minutes) on any one topic with the help of software.

08 Describe any two objects with the help of software.

**Learning Resources:**

Sr. No.	Author	Title	Publisher
01	MSBTE, Mumbai.	Text book of Communication Skills.	MSBTE, Mumbai.
02	MSBTE, Mumbai.	CD On Communication Skills	MSBTE
03	Joyeeta Bhattacharya	Communication Skills.	Reliable Series
04	Communication Skills	Sanjay Kumar, Pushpa Lata	Oxford University Press

**Web Sites for Reference:**

Sr. No	Website Address
01	Website: <a href="http://www.mindtools.com/page8.html-99k">www.mindtools.com/page8.html-99k</a>
02	Website: <a href="http://www.khake.com/page66htm/-72k">www.khake.com/page66htm/-72k</a>
03	Website: <a href="http://www.BMConsultantIndia.Com">www.BM</a> Consultant India.Com
04	Website: <a href="http://www.letstak.co.in">www.letstak.co.in</a>
05	Website: <a href="http://www.inc.com/guides/growth/23032.html-45k">www.inc.com/guides/growth/23032.html-45k</a>

**Course Name : All Branches of Diploma in Engineering and Technology.**

**Course Code : CC/EC/MC/XC/GC**

**Semester : Second**

**Subject Title : Engineering Mathematics**

**Subject Code :17917**

**Teaching and Examination Scheme**

Teaching Scheme			Examination Scheme					
TH	TEST	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
09	01	--	03	100	--	--	--	100

**NOTE:**

- **One tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

This subject is an extension of Basic mathematics of first semester and a bridge to further study of applied mathematics. The knowledge of mathematics is useful in other technical areas.

Differential calculus has applications in different engineering branches. For example concepts such as bending moment, curvature, maxima and minima.

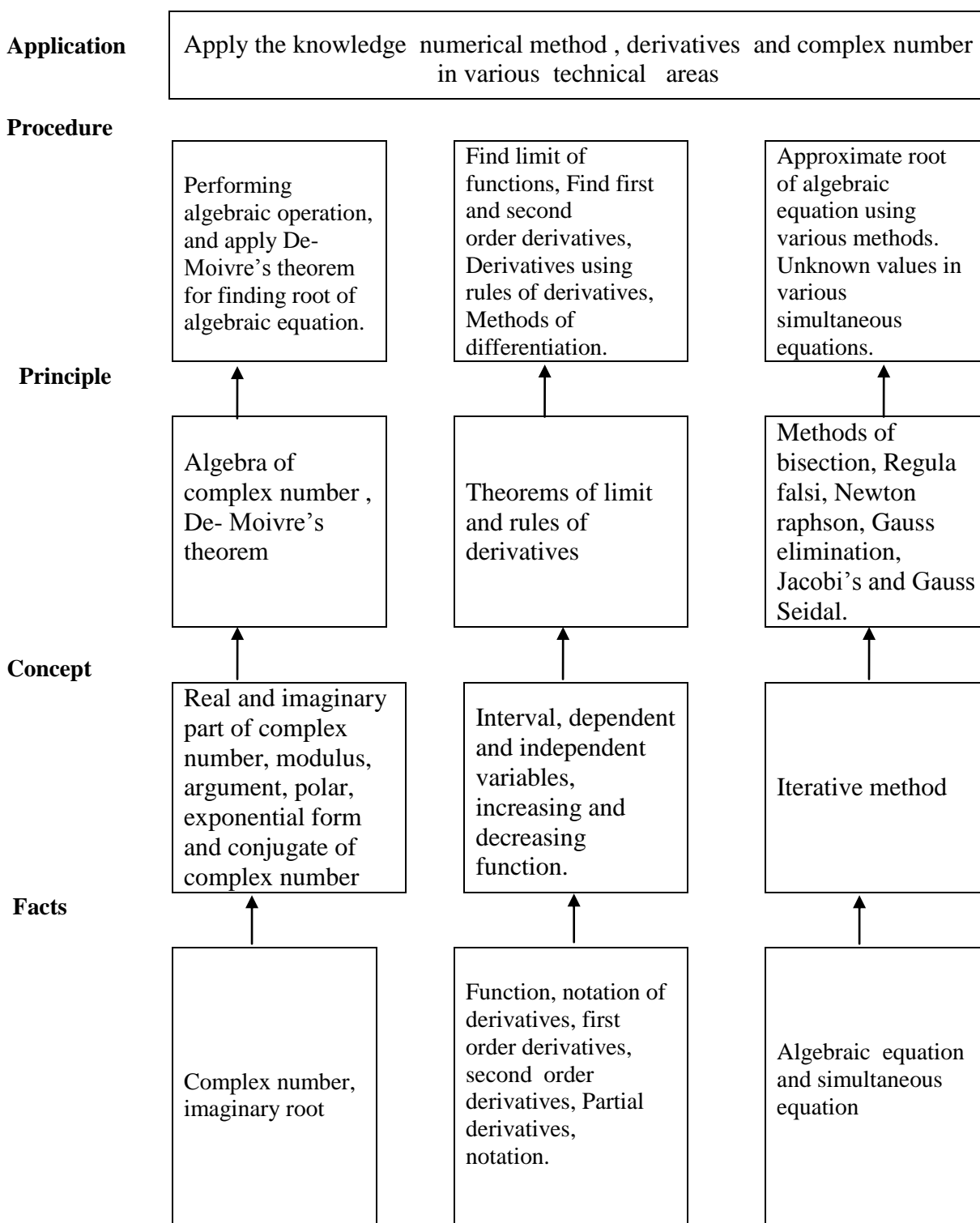
Numerical methods are used in programming as an essential part of computer engineering. For solution of problems in electrical circuits and machine performances complex number is used engineering mathematics lays the foundation to understand technical principles in various fields.

**General objectives:**

Student will be able to

- 1) Use complex numbers for representing different circuit component in complex form to determine performance of electrical circuit and machines.
- 2) Apply rules and methods of differential calculus to solve problems.
- 3) Apply various numerical methods to solve algebraic and simultaneous equations.

**Learning Structure:**





**Content Theory:**

Topic	Hours	Marks
<b>Topic 1 - Complex number</b>		
<b>1.1 Complex Number</b> ----- <b>14</b> <b>Specific objectives :</b> ➤ Find roots of algebraic equations which are not in real. • Definition of complex number, Cartesian, polar and exponential forms of complex number. • Algebra of complex number such as equality, addition, subtraction, multiplication and division. • De- Moivre's theorem with simple examples. • Euler's form of circular functions, hyperbolic functions and relation between circular and hyperbolic functions.	<b>08</b>	<b>14</b>
<b>Topic 2 - Differential Calculus</b>		
<b>2.1 Function</b> ----- <b>14</b> <b>Specific objectives :</b> ➤ Identify the function and find the value of function. • Definition of function, range and domain of function. • Value of function at a point. • Types of functions and examples.	<b>08</b>	<b>58</b>
<b>2.2 Limits</b> ----- <b>20</b> <b>Specific objectives :</b> ➤ To evaluate limit of function. • Concept and definition of limit. • Limits of algebraic, trigonometric, logarithmic and exponential functions with examples.	<b>08</b>	
<b>2.3 Derivatives</b> ----- <b>24</b> <b>Specific objectives :</b> ➤ Find the derivatives by first principle. ➤ Solve problems using rules and methods of derivatives • Definition of derivatives, notation, derivatives of standard function using first principle. • Rules of differentiation such as, derivatives of sum or difference, product, and quotient with proofs. • Derivative of composite function with proof ( Chain rule ) • Derivatives of inverse trigonometric functions using substitution • Derivatives of inverse function. • Derivatives of implicit function. • Derivatives of parametric function. • Derivatives of one function w.r.t another function. • Logarithmic differentiation. • Second order differentiation.	<b>12</b>	
<b>Topic 3 - Numerical Method</b>		
<b>3.1 Solution of algebraic equation</b> ----- <b>14</b> <b>Specific objectives :</b> ➤ Find the approximate root of algebraic equation. • Bisection method • Regula falsi method • Newton Rapshon method	<b>06</b>	<b>28</b>

<b>3.2 Numerical solution of simultaneous equations ----- 14</b>		
<b>Specific objectives :</b>		
➤ Solve the system of equations in three unknowns.		
• Gauss elimination method		
• Jacobi's method		
• Gauss Seidal method		
<b>Total</b>	<b>48</b>	<b>100</b>

**Assignments:**

- 1) Assignment are to be used to get enough practice.

**List of Assignments:**

Sr No.	Topic for Assignments
1	Complex number ( Examples based on algebra of complex numbers)
2	Complex number ( Examples based on De Moivre's theorem and Euler's formulae)
3	Function
4	Limit (algebraic and trigonometric functions)
5	Limit (logarithmic and exponential functions)
6	Derivatives by first principle
7	Derivatives ( Examples based on formulae of standard functions and rules )
8	Derivatives ( Examples based on methods of differentiation)
10	Solution of algebraic equations
11	Solution of simultaneous equations

**Learning Resources:****1) Books:**

Sr. No.	Title	Authors	Publication
1	Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
2	Calculus : Single Variable	Robert T. Smith	Tata McGraw HILL
3	Advanced Engineering mathematics	Dass H. K	S. Chand Publication New Delhi
4	Fundamentals of Mathematical Statistics	S. C. Gupta and Kapoor	S. Chand Pablication New Delhi
5	Higher Engineering Mathematics	B. S .Grewal	Khanna publication New Delhi
6	Applied Mathematics	P. N. Wartikar	Pune vidyarthi Griha Prakashan, Pune

**2) Websites: [www.khan](http://www.khanacademy) academy**

**Course Name : Mechanical Engineering Group**

**Course Code : CC/EC/MC/XC/GC**

**Semester : Second**

**Subject Title : Applied Science (Physics)**

**Subject Code : 17921**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TEST	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
06	01	22+2*	02	50	25@	--	--	75

**NOTE:**

- **One tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**
- **Applied Science is divided into two parts - Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.**

**Rationale:**

Applied physics is a powerful instrument in engineering and technology. It is an important subject for mechanical engineering group courses.

The topics on Rectilinear and Angular motion, kinetics and work power energy will be useful in understanding motion, velocity, impulse, applications such as recoil of gun, motion of lift, potential, kinetic energy, torque etc.

The topics on projectile and circular motion will be useful in various applications in mechanical, production and automobile Engineering field.

The topics on non destructive testing will be useful in testing various materials used in Mechanical and Automobile Engineering field.

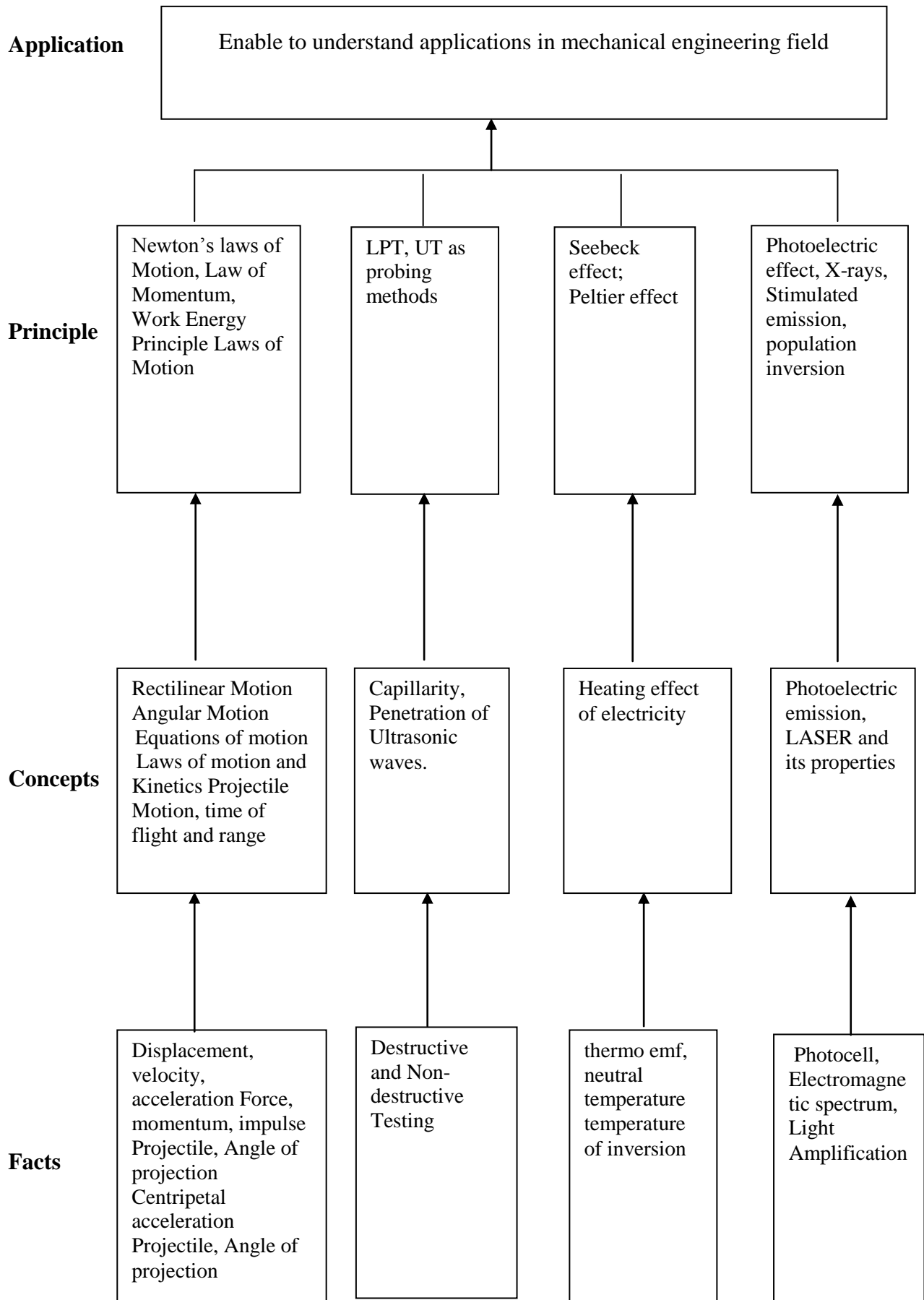
The topics on thermocouple will be useful in the area of refrigeration and air-conditioning units for controlling various parameters of working.

Principle of Photocell and its applications are required in study of solar cells, photovoltaic cells. Laser will be useful in various operations in automobile engineering. The study of this subject matter will make the student versatile, innovative in the technical field.

**General Objectives:** Students will able to:

- 1) Understand between kinematics and kinetics and solve application based problems.
- 2) Understand work and power and graphical representation of work.
- 3) Understand the projectile motion and solve related problems
- 4) Understand the principle of production ultra Sonics waves and study its applications.
- 5) Understand destructive and non destructive testing of the materials
- 6) Understand principle of Photocell and its applications
- 7) Know the basic properties of laser principle of laser

**Learning Structure:**



**Applied Physics (Mechanical Engineering Group) Theory:**

Topics and Contents	Hours	Marks
<p><b>Topic 1] Motion</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State equations of motion.</li> <li>➤ Apply laws of motion to solve problems.</li> <li>➤ Differentiate between linear and circular motion,</li> <li>➤ State meaning of centripetal acceleration, centripetal force,</li> </ul> <p><b>1.1 Rectilinear and Angular Motion [06 Marks]</b></p> <ul style="list-style-type: none"> <li>• Equations of motion: <math>v = u + at</math>, <math>S = ut + \frac{1}{2}at^2</math>, <math>v^2 = u^2 + 2as</math> (no derivation), distance traveled by particle in <math>n^{\text{th}}</math> second, (only equation), Uniform velocity, uniform acceleration and uniform retardation, equations of motion for motion under gravity.</li> <li>• Definition of angular displacement, angular velocity, angular acceleration, relation between angular velocity and linear velocity, three equations of angular motion (no derivation) angular distance traveled by particle in <math>n^{\text{th}}</math> second (only equation).</li> </ul> <p><b>1.2 Kinetics and Work Power Energy [06 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definitions of momentum, impulse, impulsive force with formulae, statements of Newton's laws of motion with equations, applications of laws of motion—recoil of gun.</li> <li>• Definition of work, power and energy, equations for potential energy. kinetic energy, work -energy principle.</li> </ul> <p><b>1.3 Projectile Motion and circular motion [04 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definition of a projectile motion, angle of projection, trajectory, time of flight and range with formulae.</li> <li>• Definition of a circular motion, centripetal acceleration, centripetal force, definition of centrifugal force, and its applications.</li> </ul>	<b>10</b>	<b>16</b>
<p><b>Topic 2] Nondestructive Testing of materials.</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Describe the method of production of ultrasonic waves</li> <li>➤ Use NDT methods for quality testing of materials in industry</li> </ul> <p><b>2.1 Ultrasonic [04 Marks]</b></p> <ul style="list-style-type: none"> <li>• Ultrasonic waves-properties, production of ultrasonic waves by piezoelectric method.</li> </ul> <p><b>2.2 Non –destructive testing methods [06 Marks]</b></p> <ul style="list-style-type: none"> <li>• Destructive and Nondestructive testing, advantages of NDT, limitations of N.D.T., different N.D.T. Methods used in industries, criteria for selection of NDT method, Liquid penetration Testing (LPT): principle, procedure and applications, Ultrasonic testing methods:-principle, procedure and applications.</li> </ul>	<b>06</b>	<b>10</b>

<p><b>Topic 3] Thermocouple:</b>  <b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State meaning of thermoelectricity.</li> <li>➤ State characteristics of thermocouple.</li> <li>• Concept of EMF, thermoelectricity, Seebeck effect; measurement of thermo emf, Peltier effect, Seebeck series; examples with different pairs of metals</li> <li>• Variation of thermo emf with temperature, graph; neutral temperature, inversion temperature, Joule effect, comparison of Seebeck effect, Peltier effect and Joule effect.</li> </ul>	<b>04</b>	<b>08</b>
<p><b>Topic 4]: Modern physics.</b>  <b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State the concept of photocell</li> <li>➤ State applications of X - ray</li> <li>➤ State properties of LASER</li> </ul> <p><b>4.1 Photo electricity: [06 Marks]</b></p> <ul style="list-style-type: none"> <li>• Photon (quantum), Plank's hypothesis, energy of photon, properties of photons.</li> <li>• Photo electric effect: Circuit diagram, process of photoelectric emission, definitions:-threshold frequency, threshold wavelength, stopping potential, characteristics of photoelectric effect</li> <li>• Work function, Einstein's photoelectric equation, photo resistor (LDR) – symbol, principle, applications, photoelectric cell:- principle, applications.</li> </ul> <p><b>4.2 X-rays: [06 Marks]</b></p> <ul style="list-style-type: none"> <li>• Origin of X-rays, production of X-rays using Coolidge's X-ray tube, minimum wavelength of X-ray, properties of X-rays, applications of X-rays: engineering, medical and scientific.</li> </ul> <p><b>4.3 Laser: [04 Marks]</b></p> <ul style="list-style-type: none"> <li>• Laser, properties of laser, spontaneous and stimulated emission, population inversion, optical pumping, engineering applications of Laser.</li> </ul>	<b>12</b>	<b>16</b>
<b>TOTAL</b>	<b>32</b>	<b>50</b>

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

- Select measuring instruments on the basis of range, least count, for measurement.
- Verify the principles, laws, using given instruments under different conditions.
- Read and interpret the graph.
- Interpret the results from observations and calculations.
- Use these results for parallel problems.

**Motor skills:**

- Handle/operate instruments.
- Measure physical quantities accurately.
- Observe the phenomenon and to list the observations in proper tabular form.
- Adopt proper procedure while performing the experiment.

**List of experiments:**

Sr No.	Title of Experiment	To be performed by a group of
1	Determine the radius of spherical surface using spherometer	2 students
2	Find refractive index of prism by using spectrometer	4 to5 students
3	Verify characteristics of thermocouple.	4 to5 students
4	Verify characteristics of photoelectric cell.	4 to5 students
5	Determine velocity of sound by resonance tube.	4 to5 students
6	Calculate coefficient of linear expansion of a metal rod using Pullinger's apparatus	4 to5 students
7	Verify Boyle's Law	2 to3 students
8	Determine Joule's constant (J) by electrical method.	4 to5 students
9	Determine temperature co-efficient of resistance of metal (conductor) using Platinum resistance thermometer	4 to5 students

**Learning resources:****1. Books:**

Sr. No.	Title	Author	Publisher
01	Engineering Physics	by R.K.Gaur and S.L.Gupta	Dhanpat Rai Publication, New Delhi
02	Fundamental of Physics	Resnick and Hailday	Wisley Toppan Publishers – England
03	Engineering Physics	V. Rajendran	Tata McGraw-Hill Publications
04	Physics	--	IGNOU-School of Engineering & Technology
05	Physics- Std XI, Std XII	--	HSC board/c CBSE Board
06	Conceptual Physics	P.G.Hewitt	Pearson Education, Tenth edition
07	A text book of engineering Physics	M.N. Avadhanulu P.G. Kshirsagar	S.Chand & co. Ltd

**2) Websites:**

<http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>, <http://physics.info>,  
<http://physics.org>, <http://about.com>, <http://classroom.com>, <http://101science.com>

**3) Videos:**

<http://www.youtube.com/watch?v=ZmhuCIL5BqQ>: work power energy  
<http://www.youtube.com/watch?v=8kOStH5QgF4>: motion in one dimension, rectilinear motion  
<http://www.youtube.com/watch?v=SsIaL3L6Jg4> :projectile motion  
<http://www.youtube.com> Laser cutter  
<http://www.cmlaser.com>

**4) CDs:**

Educational Cd of NCERT

Educational cd of Pearson education India

**5) PPT:**

[www.dboccio.com/Physics%20PowerPoints/Work,%20Energy,](http://www.dboccio.com/Physics%20PowerPoints/Work,%20Energy)

[www.slideshare.net/donpraju/laser-ppt](http://www.slideshare.net/donpraju/laser-ppt)

[www.research.usf.edu/cs/rad/laser-ppt](http://www.research.usf.edu/cs/rad/laser-ppt)

[www.studyvilla.com/laser-ppt-ruby](http://www.studyvilla.com/laser-ppt-ruby) laser

[www.khanacademy.com](http://www.khanacademy.com)



**Course Name : Mechanical Engineering Group**

**Course Code : CC/EC/MC/XC/GC**

**Semester : Second**

**Subject Title : Applied Science (Chemistry)**

**Subject Code : 17922**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TEST	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
06	01	22+2*	02	50	25@	--	--	75

**NOTE:**

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- **Applied Science is divided into two parts - Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.**

**Rationale:**

Study of Applied chemistry is essential to mechanical engineering course group. It provides knowledge about the appropriate use of engineering materials, their protection and lubrication process in different working conditions of machines.

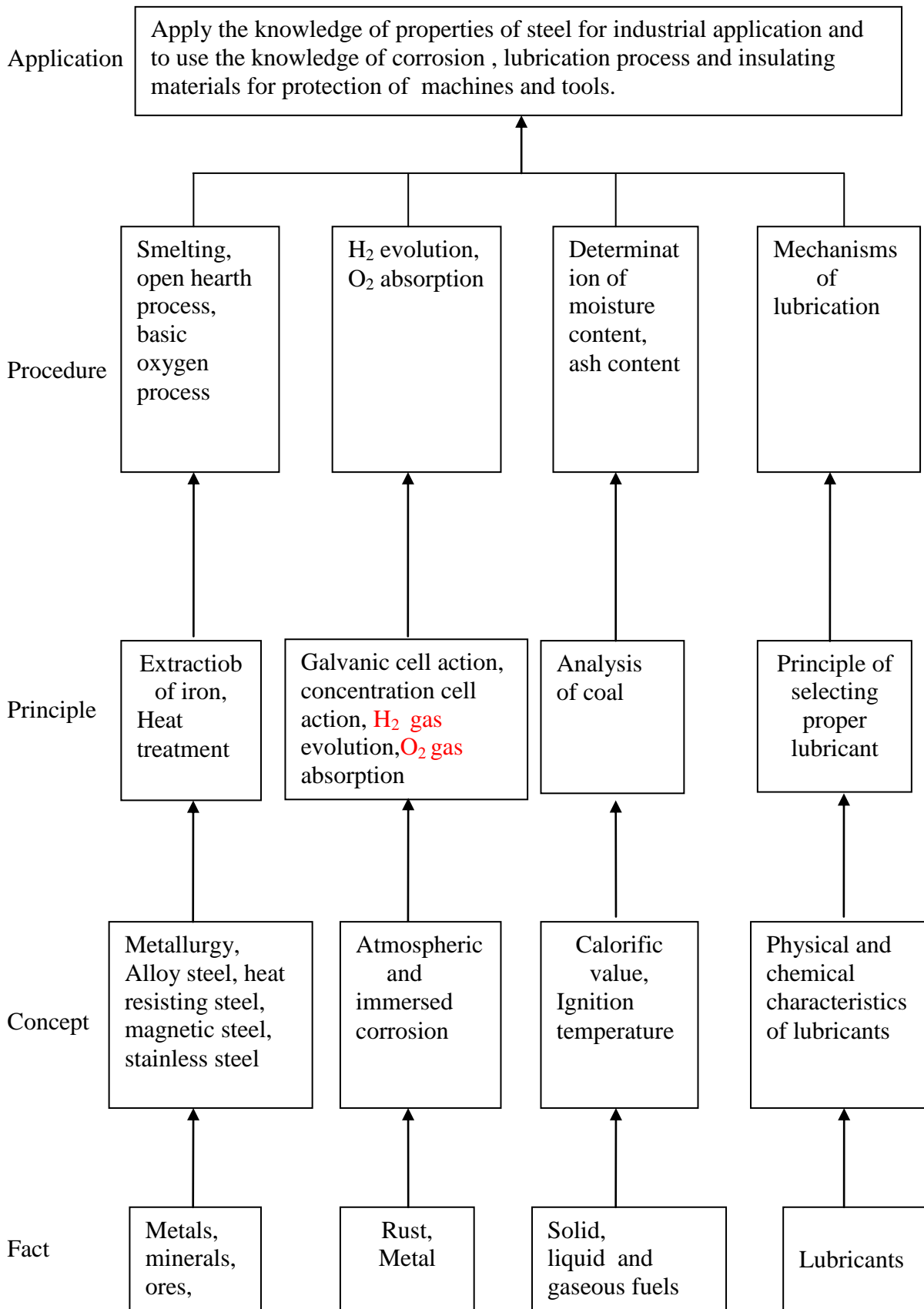
The study of extraction of iron, heat treatment method to improve mechanical properties of iron without changing its chemical composition, different alloys of iron are also useful in mechanical engineering application. Study of lubricants and corrosion of metal will enable the learner to understand trouble free working and operations of different machines and equipments. The study of above subject matter will enable the learner in solving problems while working in industries. This will be the gateway for development of reasoning capacity of student and understanding new technology as well.

**General Objectives:**

The student will be able to:

1. Know the appropriate use of metals and non metallic materials in engineering and technology.
2. Understand various factors influencing corrosion.
3. Judge the selection of proper lubricants.
4. Know properties and applications of different types of fuels.

**Learning Structure:**



**Theory Content:**

Topic and Contents	Hours	Marks
<p><b>Topic:1] Metallurgy:</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Explain the process of extraction of iron from its ore.</li> <li>➤ Explain different processes of Heat treatment.</li> <li>➤ State effects of alloying elements on properties of steels.</li> </ul> <p><b>1.1 Metallurgy: [6 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definitions of metallurgy, ores of iron.</li> <li>• Extraction of pig iron by smelting in Blast furnace with chemical reactions in different zones, products of blast furnace- composition, properties and applications of pig iron, slag and flue gases.</li> <li>• Properties and applications of commercial forms of iron- pig iron, cast iron, wrought iron.</li> </ul> <p><b>1.2 Steels: [8 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definition of steel, preparation of steel from pig iron using open hearth process, basic oxygen process.</li> <li>• Classification of plain carbon steel- low carbon, medium carbon, high carbon steels with their properties and applications.</li> <li>• Alloy Steels: Effects of alloying elements C, Ni, Co, V, Mo, W, Cr on properties of steel, composition, properties and applications of heat resisting steel (nichrome), magnetic steel (alnico), 18-8 stainless steel, 18-4-1 high speed steel.</li> <li>• Heat Treatment of steels: Definition and purposes of -hardening, tempering, annealing, normalizing.</li> </ul>	<b>08</b>	<b>14</b>
<p><b>Topic 2] Corrosion:</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Explain Mechanism of atmospheric corrosion and immersed corrosion.</li> <li>➤ Describe different methods of protection of metal from corrosion</li> </ul> <p><b>2.1 Corrosion: [6 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definition of corrosion, Types of corrosion.</li> <li>• Atmospheric Corrosion: Definition, mechanism of oxidation corrosion, types of oxide films and their significance, factors affecting rate of atmospheric corrosion.</li> <li>• Immersed Corrosion: Definition, mechanism of immersed corrosion by galvanic cell action- with evolution of hydrogen gas and absorption of oxygen gas, factors affecting immersed corrosion.</li> </ul> <p><b>2.2 Protection of metals by: [8 Marks]</b></p> <ul style="list-style-type: none"> <li>• Modification of environment, modification of properties of metal, electrochemical protection by sacrificial anodic protection and impressed current cathodic protection, use of protective coatings.</li> <li>• Application of metallic coatings: By galvanising, tinning, metal spraying, electroplating, metal cladding, cementation- sherardizing, chromising, colourising.</li> <li>• Application of non-metallic coatings: paint-definition, characteristics, constituents of paint and their functions.</li> </ul>	<b>10</b>	<b>14</b>

<p><b>Topic 3] Fuels:</b>  <b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State characteristics of a good fuel.</li> <li>➤ Write significance of proximate analysis of a fuel.</li> <li>➤ Explain fractional distillation of crude petroleum.</li> </ul> <p><b>3.1 Properties of fuels:</b>  <b>[4 Marks]</b></p> <ul style="list-style-type: none"> <li>• Definition of a fuel, calorific value and ignition temperature. Characteristics of a good fuel, Classification of fuels with suitable examples, advantages and disadvantages of solid fuels, liquid fuels and gaseous fuels.</li> </ul> <p><b>3.2 Classification of fuels :</b>  <b>[8 Marks]</b></p> <ul style="list-style-type: none"> <li>• Solid fuels: Analysis of solid fuel - proximate analysis for determination of moisture, volatile matter, ash and fixed carbon, significance of proximate analysis, determination of gross calorific value by using Bomb calorimeter.</li> <li>• Liquid fuels: Origin, fractional distillation of crude petroleum, boiling range, composition, and applications of petroleum fractions obtained, composition, properties, applications of-Biodiesel.</li> <li>• Gaseous fuels: Composition, properties, applications of- Biogas, LPG, CNG,</li> </ul>	<b>07</b>	<b>12</b>
<p><b>Topic 4] Lubricants:</b>  <b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Write functions of lubricants</li> <li>➤ Describe the mechanism of lubrication.</li> <li>➤ State characteristics of Lubricants.</li> </ul> <p>Lubricant: definition of lubricant, functions of lubricants.</p> <ul style="list-style-type: none"> <li>• Classification of lubricant:  Solid lubricants- characteristics and applications of graphite and molybdenum disulphide. Liquid lubricants – characteristics and applications of synthetic fluid (silicone oil), water as a lubricant (coolent). Semisolid lubricant- characteristics and applications of grease (plastic lubricant).</li> <li>• Mechanism of Lubrication: Definition of by lubrication, mechanism of fluid film lubrication, boundary lubrication, extreme pressure lubrication</li> <li>• Characteristics: Physical characteristics of lubricants -viscosity, viscosity index, oiliness, volatility, flash and fire point, cloud and pour point. Chemical characteristics of lubricants-acid value or neutralization number, emulsification, saponification value.</li> <li>• Selection of Lubricants for road rollers, steam engines, sewing machine, concrete mixer, I.C engine, cutting tools, gears.</li> </ul>	<b>07</b>	<b>10</b>
<b>Total</b>	<b>32</b>	<b>50</b>

**Practical:****Intellectual Skills:**

1. Select proper equipments and instruments.
2. Interpret the results.
3. Plan the set up of the experiment.
4. Verify the characteristics of materials.

**Motor Skills:**

1. Handle various laboratory reagents.
2. Measure chemicals accurately.
3. Observe the completion of reaction.
4. Note down readings.
5. Follow systematic procedure step by step.

**List of Experiments:**

Sr. No.	Name of the Experiment
1	Determine the percentage of Iron in given steel sample by redox titration.
2	Find the relation between loss in weight of aluminium strip in acidic and alkaline medium and rate of corrosion.
3	Determine electrode potential of various metals to study their tendency towards corrosion.
4	Determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution by using pH meter.
5	Determine thinner content in oil paint.
6	Determine the percentage of moisture content in the given coal sample.
7	Determine the percentage of ash content in the given coal sample by proximate analysis.
8	Determine coefficient of viscosity using Ostwald's Viscometer.
9	Determine acid value of lubricant by KOH.

**References****1. List of Reference****Books:**

Sr. No.	Author	Name of the book	Publisher
01	Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
02	S. S. Dara	Engineering Chemistry	S. Chand Publication
03	R. Sivakumar and N. Sivakumar	Engineering Chemistry	Tata McGraw-Hill Publishing Company Limited
04	R. Srinivasan	Engineering Materials and Metallurgy	Tata McGraw-Hill Education Private Limited
05	Vedprakash Mehta	Polytechnic Chemistry	Jain brothers

**2. List of web sites, Videos and Animations:**

- [http://www.substech.com/dokuwiki/doku.php?id=full\\_index\\_of\\_articles\\_on\\_metals](http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_metals)  
[http://www.substech.com/dokuwiki/doku.php?id=full\\_index\\_of\\_articles\\_on\\_ceramics](http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_ceramics)  
[http://www.substech.com/dokuwiki/doku.php?id=full\\_index\\_of\\_articles\\_on\\_polymers](http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_polymers)  
[http://www.substech.com/dokuwiki/doku.php?id=full\\_index\\_of\\_articles\\_on\\_composites](http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_composites)  
[http://www.substech.com/dokuwiki/doku.php?id=full\\_index\\_of\\_articles\\_on\\_fluids](http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_fluids)  
<http://www.usetute.com.au/corrosion.html>  
<http://www.youtube.com/watch?v=8s8rcnxqLIw>  
[http://www.sherardizing.com/resources/files/9\\_Sherardizing\\_Corrosion.pdf](http://www.sherardizing.com/resources/files/9_Sherardizing_Corrosion.pdf) (Sherardizing)  
[http://www.galvanizeit.org/aga/animation/4728?keepThis=true&TB\\_iframe=true&height=480&width=640](http://www.galvanizeit.org/aga/animation/4728?keepThis=true&TB_iframe=true&height=480&width=640) (Galvanizing)  
[http://www.ehow.com/list\\_6725219\\_different-types-metal-cladding.html](http://www.ehow.com/list_6725219_different-types-metal-cladding.html) (Metal Cladding)

**Course Name : Mechanical Engineering Group**

**Course code : MG/MC**

**Semester : Second**

**Subject Title : Engineering Drawing**

**Subject Code :17923**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TESR T	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
05	01	24	04	100	--	---	25@	125

**NOTE:**

- 1. Students should use two separate A3 size sketchbooks, one for class work practice and another for assignment.**
- 2. Students should solve assignment on each topic.**
- 3. Use approximately 570mm×380mm Size Drawing Sheet for Term Work.**

**NOTE:**

- **One tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

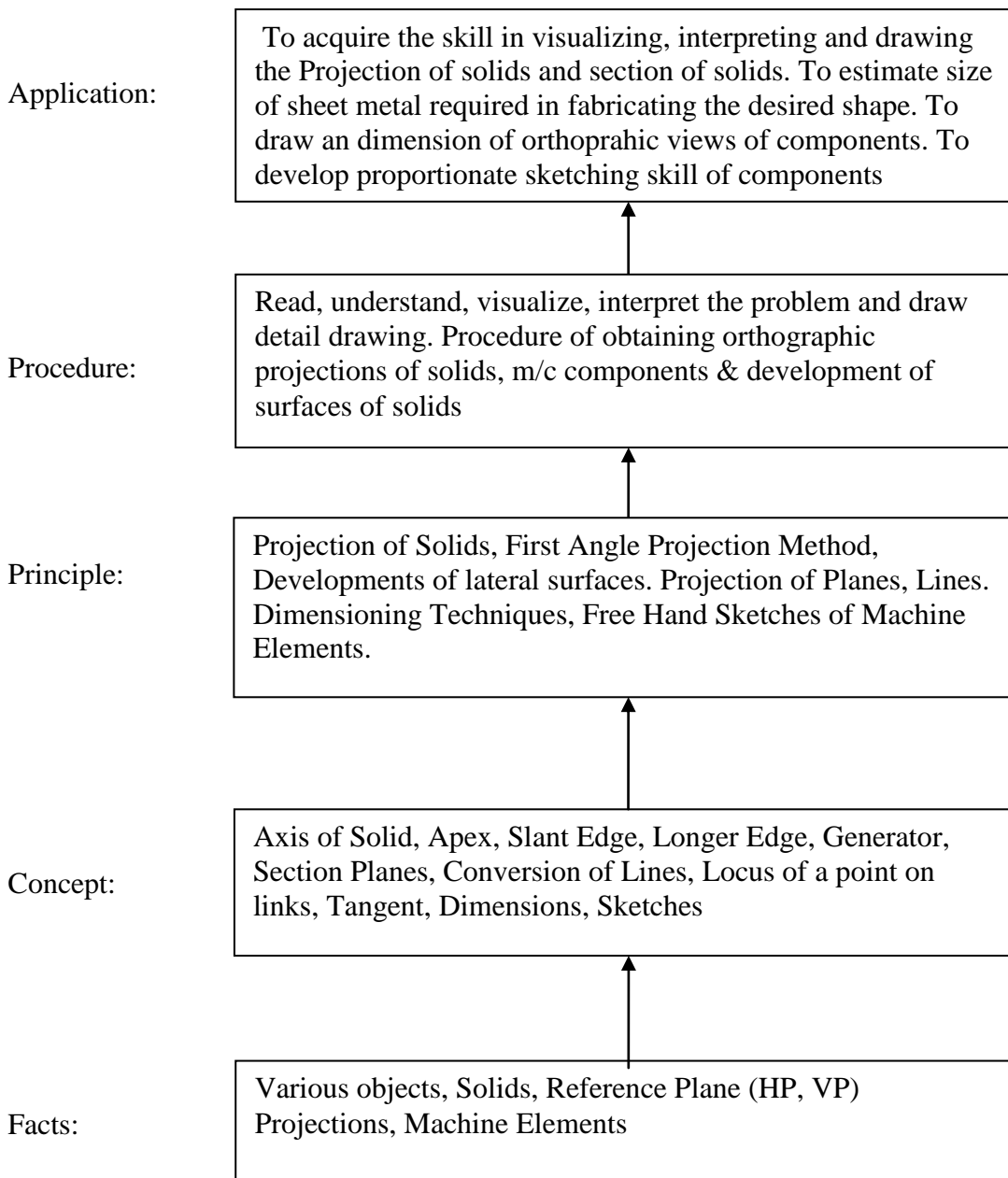
Engineering drawing is the graphical language of engineers. It describes the scientific facts, concepts, principles and techniques of drawing in any engineering field to express the ideas, conveying the instructions, which are used to carry out jobs in engineering field. This course aim for building a foundation for the further course in drawing and other allied subjects.

**Objectives:**

After studying this subject, the students will be able to:

1. Understand the basic concepts of projection of different entities.
2. Visualize and draw views of objects in different positions.
3. Develop lateral surfaces of different solids.
4. Prepare proportionate free hand sketches of basic machine elements.

**Learning Structure:**



**Theory:**

Topic and Content	Hours	Marks
<b>1. Projection of Lines and planes</b> Specific Objectives Understand and draw the projections of lines and planes  1.1 Lines inclined to both reference plane and limited to both ends in one quadrant.-----6 marks 1.2 Projection of simple planes of circular, square, rectangular, rhombus, pentagonal, and hexagonal, inclined to one reference plane and perpendicular to the other. -----10 marks	02	16
<b>2. Projection of Solids</b> Specific Objectives Visualize and draw the projection of regular solids on HP, VP and auxiliary plane  2.1 Projections of Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube with their axes inclined to one reference plane and parallel to other.-----10 marks 2.2 Projections of same solids on auxiliary plane. -----6 marks	02	16
<b>3. Sections of Solids.</b> Specific Objectives Visualize and draw the projection of different cut models of regular solids  3.1 Cone, Pyramid and Tetrahedron resting on their base on Horizontal Plane. -----5 marks 3.2 Prism, Cylinder: -----6 marks a) Axis parallel to both the reference plane b) Resting on their base on HP. 3.3 Section plane inclined to one reference plane and perpendicular to other. -----5 marks	02	16
<b>4. Developments of Surfaces.</b> Specific Objectives Develop the lateral surfaces of various solids and understand its engineering applications  4.1 Developments of Lateral surfaces of cube, prism, cylinder, pramid, cone -----8 marks 4.2 Applications such as tray, funnel, Chimney, pipe bends etc. -----8 marks	02	16
<b>5. Sectional Orthographic and missing views ( First angle method)</b> Specific Objectives Visualize and draw missing views and sectional views of different objects  5.1 Types of sections and Conversion of pictorial view into sectional orthographic views.(complete object involving slots, threads, ribs etc)-----10 marks 5.3 Draw missing view from the given Orthographic views -----10 marks	04	20
<b>6. Free Hand Sketches of m/c elements.</b> Specific Objectives  <ul style="list-style-type: none"> <li>• Prepare proportionate free hand sketches of given m/c elements.</li> <li>• Understand function and use of machine element</li> </ul> Free hand sketches of machine elements such as nuts, bolts, set screws, rivet	04	16



heads, riveted joints, locking arrangements for nuts, threads, foundation bolts, Flange coupling, pulleys.-----		
<b>Total</b>	<b>16</b>	<b>100</b>

**Skills to be developed for practical:****Intellectual skills**

- 1) To develop ability to differentiate between true length, shape and apparent length and shape
- 2) To interpret the position of lines, planes, solids with reference plane.
- 3) Able to interpret the development of surfaces of different solids.
- 4) To interpret the missing views from given orthographic views.
- 5) To identify various parts of machine like nuts, bolts, screws, different threads, couplings.
- 6) To understand the sequence of CAD commands

**Motor Skills**

- 1) Able to draw Orthographic Projections of line, planes and solids with given orientation
- 2) To develop ability to draw sectional orthographic views of given solids, when it is cut by section plane in different position with reference planes.
- 3) Ability to draw true shape of section.
- 4) Ability to draw the development of surfaces of different objects in different shapes.
- 5) Develop ability to draw sectional views and missing view from given orthographic views
- 6) Develop ability to draw orthographic views of different machine elements
- 7) Use of CAD software for preparing drawings and get the output.

**Practical:**

1. Projections of Lines and Planes-----6 hours Two problems on projection of lines and two problems on projection of planes (1 Sheet)
2. Projection of solids-----8 hours Two problems on two different solids, one by axis of solid inclined to HP and parallel to VP and another problem by axis of solid inclined to VP and parallel to HP. - (1 Sheet)
3. Section of solids-----8 hours Two problems on different solids. One problem, section plane inclined to HP and perpendicular to VP and in another problem, section plane inclined to VP and Perpendicular to HP. - (1 Sheet)
4. Development of surfaces-----8 hours Any two problems on development of surfaces of different objects.- (1 Sheet)
5. Sectional Orthographic and Missing view -----10 hours One problem on sectional views and one problem on missing views. - (1 Sheets)
6. Free Hand Sketches-----8 hours Any ten specified elements.- (1 Sheets)
7. Using CAD software-----16 hours Draw any two machine elements with dimensions

**Learning Resources:****1. Books:**

<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publication</b>
1	Engineering Drawing	N. D. Bhatt	Charotar Publishing House, 2010
2	Engineering Drawing	D.Jolhe	Tata McGraw Hill Edu., 2010
3	Engineering Drawing	M.B.Shah, B.C. Rana	Pearson, 2010
4	Engineering Drawing	R. K. Dhawan	S. Chand Co. , Reprint 2010
5	Text Book on Engineering Drawing	K.L.Narayan, P.Kannaiah	Scitech Publications, 24 <sup>th</sup> Reprint August 2011
6	Engineering Drawing and Graphics + AutoCAD	K. Venugopal	New Age Publication, Reprint 2006
7	Engineering Drawing practice for schools and colleges	IS Codes SP – 46.	--

**2. Video Cassettes / CD's**

1. Instructional / Learning CD developed by ARTADDICT.

