Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)

Evaluation Scheme & Syllabus for

Department of Electrical Engg.

DIPLOMA ELECTRICAL ENGINEERING

(I Semester)

(Effective from session 2025-26)

Evaluation Scheme (2022-23)

DIPLOMA ELECTRICAL ENGINEERING

Study And Evaluation Scheme For Diploma Electrical Engineering												
Year- 1st /Semester -1st												
Subject Code	Subjects Name	Study Scheme Periods/Week			Credits	Marks in Evaluation Scheme						Total Marks of Internal & External
						Internal Assessment			External Assessment			
		L	T	P		Th	Pr	Total Internal	Th	Pr	Total External	Grand Total
DCOMMEE101	Communication Skills-I	2	0	0	2	30	-	30	70	-	70	100
DAPPLEE102	Applied Mathematics –I	3	1	0	4	30	-	30	70	-	70	100
DAPPLEE103	Applied Physics –I	2	1	0	3	30	-	30	70	-	70	100
DAPPLEE104	Applied Chemistry	2	1	0	3	30	-	30	70	-	70	100
DELECEE105	Electrical & Electronics Engineering Materials	3	0	0	3	30	-	30	70	-	70	100
DCOMMEE106	Communication Skills-I Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLEE107	Applied Physics- I Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLEE108	Applied Chemistry Lab	0	0	2	1	-	25	25	-	25	25	50
DGENEEE109	General Workshop Practice-I Lab	0	0	4	2	-	25	25	-	25	25	50
Total		12	3	10	20	150	100	250	350	100	450	700
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												350

Department of Electrical Engineering
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P.K. University, Shivpuri (MP)
Diploma I Year I Semester

DCOMMEE101
COMMUNICATION SKILLS – I
(Common to all branch of Diploma engineering)

L	T	P
2	0	0

DETAILED CONTENTS

1 Basics of Communication **(13 periods)**

1.1 Definition and process of communication
1.2 Types of communication - formal and informal, oral and written, verbal and non-verbal
1.3 Communications barriers and how to overcome them
1.4 Barriers to Communication, Tools of Communication

2 Application of Grammar **(18 periods)**

2.1 Parts of Speech (Noun, verb, adjective, adverb) and modals
2.2 Sentences and its types
2.3 Tenses
2.4 Active and Passive Voice
2.5 Punctuation
2.6 Direct and Indirect Speech

3 Reading Skill **(10 periods)**

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4 Writing Skill **(15 periods)**

4.1 Picture composition
4.2 Writing paragraph
4.3 Notice writing

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd.Delhi.
Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
The Functional aspects of Communication Skills – Dr. P. Prsad, S.K. Katria & Sons, New Delhi
Q. Skills for success – Level & Margaret Books, Oxford University Press.
e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.
Websites for Reference:
http://www.mindtools.com/ page 8.html – 99k
http://www.letstalk.com.in
http://www.englishlearning.com
http://learnenglish.britishcouncil.org/en/
http://swayam.gov.in

Department of Electrical Engineering
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DAPPLEE102
APPLIED MATHEMATICS I

[Common to All Diploma Engineering Courses]

L	T	P
3	1	0

ALGEBRA-I :

1.1 Series : AP and GP; Sum, nth term, Mean
1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.
1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

2. ALGEBRA-II:

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number : Complex numbers, Representation, Modulus and amplitudDemoivre theorem, its application in solving algebraicequations, Mod. function and its properties..

3. TRIGONOMETRY :

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relationship between sides and angle of a triangle.
3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I :

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability. 4.2 Methods of finding derivative, - Function of a function, Logaritimic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :

5.1 Higher order derivatives, Leibnitz theorem.
5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.
5.3 Application - Finding Tangants, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

Department of Electrical Engineering
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Diploma I Year I Semester

DAPPLCE103
APPLIED PHYSICS-I
[Common to All Diploma Engineering Courses]

L	T	P
2	1	0

1. UNITS AND DIMENSIONS (4 MARKS)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogeneity of dimensions and applications of homogeneity principle to: (i) Checking the correctness of physical equations, (ii) Deriving relations among various physical quantities, (iii) Conversion of numerical values of physical quantities From one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measurements, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement(Combination of errors in addition, subtraction, multiplication and powers). Significant figures, and order of accuracy in respect to instruments,

3. CIRCULAR MOTION (5 MARKS)

Central forces. Uniform Circular motion (Horizontal and Vertical cases),angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES :(5 Marks)

Gravitational force, Acceleration due to gravity and its variation w..r. to height and depth from earth, Kapler's Law, Escope and orbital velocity, Time period of satellite, Geo- stationary, Polar satellites.

DYNAMICS OF RIGID BODY (ROTATIONAL MOTION) (6 MARKS)

Rigid body, Rotational motion, Moment of inertia, Theorems(Perpendicular and Parallelaxis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindercal),Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane . Concept of Fly wheel.

6. FLUID MECHANICS :(5 MARKS)

Surface tension, Capillary action and determination of surface tension from capilary rise method, Equation of continuity (A1V1=A2V2), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. FRICTION :(4 MARKS)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by stoke's method.

8. HARMONIC MOTION (6 MARKS)

Periodic Motion , characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. HEAT & THERMODYNAMICS: (6 MARKS)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. ACOUSTICS (5 MARKS)

Definition of pitch, loudness, quality and intensity ofsound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Accoustics of building defects and remedy.

[Common to All Diploma Engineering Courses]

Department Of Electrical Engineering
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I Year I Semester

DAPPLEE104
APPLIED CHEMISTRY

L	T	P
2	1	0

[Common to All Diploma Engineering Courses]

1. **ATOMIC STRUCTURE :** Basic concept of atomic structure, Matter wave concept, Quantum number, Haisenberg's Uncertainty Principle, Shaples of orbitals.

2. **CHEMICAL BONDING :**Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. **CLASSIFICATION OF ELEMENTS :**Modern classification of elements (s,p,d and f blcok elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

4. **ELECTRO CHEMISTRY-I:**Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. **ELECTRO CHEMISTRY-II:**Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode

potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. **CHEMICAL KINETICS :**Law of mass action, order and molecularity of rection. Activation energy, rate constants, Ist order reactions and 2nd order reactions.

7. **CATALYSIS :**Definition Characteristics of catalytic reactions, Catalytic promotors and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. **SOLID STATE :**Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. **FUELS :**Definition, its classification, high & low Calorific value.Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Disel and Petrol), Benzol and Power alchol. Knocking, Anti-knocking agents, Octane number and Cetane number.Cracking and its type, Gasoling from hydrogenation of coal (Bergius process and Fischer tropsch's process)Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG.Numerical Problems based on topics

10. **WATER TREATMENT :**Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embritlement, primming and foarming in biolers.Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. **COLLOIDAL STATE OF MATTER :**Concept of collidal and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, tyndal effect, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

12. **LUBRICANTS :**Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. **HYDROCARBONS:**

A.Classification and IUPAC nomeuclature of organic compounds hamologous series. (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. **ORGANIC REACTIONS & MECHANISM:**

1. Fundamental auspects -A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion

B. Inductive effect, Mesomeric effect, Electromeric effect.

2 .A. Mechanism of addition reaction (Markonicove's Rule,Cyanohydrin and Peroxide effect),

B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehyrohalogenation of primary alkyl halide.

15. **POLYMERS**

1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms) 2. Thermosetting and Thermoplastic resen -

A. Addition polymers and their industrial application- Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.

B. Condensation polymer and their industrial application :

Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.

3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers(Silicon)

16. **SYNETHETIC MATERIALS :**

A. Introduction - Fats and Oils

B. Saponification of fats and oils , Manufacturing of soap.

3. EXPLOSIVES: TNT, RDX, Dynamite.

4. Paint and Varnish

Department Of Electrical Engineering
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I Year I Semester

DELECEE105
ELECTRICAL AND ELECTRONICS ENGG. MATERIALS

L	T	P
3	0	0

1. Classification **(10 Periods)**

Classification of materials into conducting, semi conducting and insulating materials through a brief reference to their atomic structure and energy bands

2. Conducting Materials **(12 Periods)**

2.1 Introduction
2.2 Resistance and factors affecting it such as alloying and temperature etc
2.3 Classification of conducting material as low resistivity and high resistivity materials, low resistance materials
2.3.1 Copper:
General properties as conductor: Resistivity, temperature coefficient,

density, mechanical properties of hard-drawn and annealed copper,
Corrosion, contact resistance. Application in the field of electrical engineering.
2.3.2 Aluminium:
General properties as conductor: resistivity, temperature coefficient, density, mechanical properties of hard and annealed aluminium, solderability, contact resistance. Applications in the field of electrical engineering.
2.3.3 Steel:
Mechanical properties of steel, applications in the field of electrical engineering.
2.3.4 Introduction to bundle conductors and its applications.
2.3.5 Low resistivity copper alloys: Brass, Bronze (cadmium and Beryllium), their practical applications with reasons for the same

2.4 Applications of special metals e.g. Silver, Gold, and Platinum etc.
2.5 High resistivity materials and their applications e.g., manganin, constantan, Nichrome, mercury, platinum, carbon and tungsten
Superconductors and their applications

3. Review of Semi-conducting Materials

Semi-conductors and their properties, Materials used for electronic components like resistors, capacitors, diodes, transistors and inductors etc.

4. **Insulating materials; General Properties: (10 Periods)**

4.1 Electrical Properties:
Volume resistivity, surface resistance, dielectric loss, dielectric strength (breakdown voltage) dielectric constant

4.2 Physical Properties:
Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness

4.3 Thermal Properties:
Heat resistance, classification according to permissible temperature rise. Effect of overloading on the life of an electrical appliance, increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity, Electro-thermal breakdown in solid dielectrics

4.4 Chemical Properties:
Solubility, chemical resistance, weather ability

4.5 Mechanical properties, mechanical structure, tensile structure

5. Insulating Materials and their applications: (10 Periods)

5.1 Plastics

5.1.1 Definition and classification

5.1.2 Thermosetting materials:
Phenol-formaldehyde resins (i.e. Bakelite) amino resins (urea formaldehyde and Melamine-formaldehyde), epoxy resins - their important properties and applications

5.1.3 Thermo-plastic materials:
Polyvinyl chloride (PVC), polyethylene, silicones, their important properties and applications

5.2 Natural insulating materials, properties and their applications

- Mica and Mica products
- Asbestos and asbestos products
- Ceramic materials (porcelain and steatite)
- Glass and glass products
- Cotton
- Silk
- Jute
- Paper (dry and impregnated)
- Rubber, Bitumen
- Mineral and insulating oil for transformers switchgear capacitors, high voltage insulated cables, insulating varnishes for coating and impregnation
- Enamels for winding wires
- Glass fibre sleeves

5.3 Gaseous materials; Air, Hydrogen, Nitrogen, SF- their properties and applications

6. Magnetic Materials: (10 Periods)

6.1 Introduction - ferromagnetic materials, permeability, B-H curve, magnetic saturation, hysteresis loop including coercive force and residual magnetism, concept of eddy current and hysteresis loss, Curie temperature, magnetostriction effect.

6.2 Soft Magnetic Materials:

6.2.1 Alloyed steels with silicon: High silicon, alloy steel for transformers, low silicon alloy steel for electric rotating machines

6.2.2 Cold rolled grain oriented steels for transformer, Non-oriented steels for rotating machine

6.2.3 Nickel-iron alloys

7. Soft Ferrites (10 Periods)

7.1 Hard magnetic materials
Tungsten steel, chrome steel, hard ferrites and cobalt steel, their applications

8. Special Materials (10 Periods)

Thermocouple, bimetals, leads soldering and fuses material and their applications, thermistor, sensistor, varistors and their practical applications.

9. Materials for Electrical Machines (10 Periods)

Introduction to various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc

RECOMMENDED BOOKS

1. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi
2. Electronic Components and Materials by Grover and Jamwal, Dhanpat Rai and Co., New Delhi
3. Electrical Engineering Materials by Sahdev, Uneek International Publications, Jalandhar
4. Electronic Components and Materials by SM Dhir, Tata Mc Graw Hill, New Delhi

Department Of Electrical Engineering
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I Year I Semester

DCOMMEE106
COMMUNICATION SKILLS – I LAB
[Common to All Diploma Engineering Courses]

L	T	P
0	0	2

LIST OF PRACTICALS

1. Listening and Speaking Exercises
2. Self and peer introduction
3. Newspaper reading
4. Just a minute session-Extempore
5. Greeting and starting a conversation
6. Leave taking
7. Thanking
8. Wishing well
9. Talking about likes and dislikes
10. Group Discussion
11. Listening Exercises.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centred activities in class room and actively participate in listening exercises

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-semester and end-semester written tests

Actual practical work, exercises and viva-voce

Presentation and viva-voce.

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I Year I Semester

DAPPLEE107

APPLIED PHYSICS LAB

[Common to All Diploma Engineering Courses]

L	T	P
0	0	2

List of Experiments-: (Any eight)

Vernier Calipers: To determine the volume of a spherical / cylindrical body and a test tube by measuring its dimensions using vernier calipers.

Screw gauge: To determine diameter of a wire, a solid ball and thickness of glass plate using screw gauge.

Spherometer: To determine radius of curvature of a spherical surface using a spherometer

Mercury thermometer: To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

5 To find the time period of a simple pendulum and determine acceleration due to gravity

6. Stoke's law: To find the coefficient of viscosity of a given liquid by measuring the terminal velocity of a spherical body.

7. Parallelogram law of forces: To verify parallelogram law of forces and find the mass of the given body.

8. Moment bar: To determine the mass of the given body using moment bar.

9. U-tube apparatus: To determine the relative density of liquid using U-tube apparatus.

10. Flywheel: To find the moment of inertia of a flywheel.

11. Simple pendulum: To determine acceleration due to gravity at a place by measuring the time period of a simple pendulum

12. Resonance column: To determine the velocity of sound in air at room temperature using resonance column apparatus

13. Cantilever: To find the time period of oscillations of a cantilever

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I Year I Semester

DAPPLEE108
APPLIED CHEMISTRY LAB
[Common to All Diploma Engineering Courses]

L	T	P
0	0	2

LIST OF PRACTICALS

1. To analyze inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals :
NH4+, Pb++, Cu++, Bi+++, Cd++, As+++, Sb+++, Sn++, Al+++, Fe+++, Cr+++, Mn++, Zn++ Co+ Ni++, Ba++, Sr++, Ca++, Mg++

B. Acid Radicals :

CO3--, S--, SO3--, CH3COO-, NO2-, No3- , Cl-, Br_ , I- , So4--

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCo3 by EDTA titration method using Eriochroma black-T indicator.

4 To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hard ness of water sample by O-Hener's method.

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I Year I Semester

DAPPLEE109
General Workshop Practice -1 Lab

L	T	P
0	0	4

DETAILED CONTENTS

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood
EX-2 Planing and sawing practice
EX-3 Making of lap joint
EX-4 Making of mortise and tenon joint
Ex-5 Making of any one utility article such as wooden- picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantages of painting, other method of surface coating i.e. electroplating etc.
EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.
EX-3 To prepare metal surface for painting, apply primer and paint the same.
EX-4 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

* The sequence of polishing will be as below:
  i) Abrassive cutting by leather wheel.
  ii) Pollishing with hard cotton wheel and with polishing material.
  iii) Buffing with cotton wheel or buff wheel.

3 Fitting Shop, Plumbing Shop & Fastening Shop:

EX-1 Study of materials, limits, fits and toterances.
EX-2 Introduction & demonstration of tools used in Fitting Shop.
EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.
EX-4 Making bolt & nut by tap and die set and make its joints
Ex-5 To drill a hole in M.S. Plate and taping the same to create threads as per need.
EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.
EX-8 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.
EX-9 Practice of bolted joints
EX-10 To prepare a rivetted joint
EX-11 To make a pipe joint
EX-12 To make a threaded joint
EX-13 Practice of sleeve joint