Note: There may be minor deviation in marks distribution. Choice question can be asked from different chapters.

Workshop Practice I
EG 1201 CE

Year: I **Total: 8hours /week**
Semester: II **Lecture: 2 hours/week**
Tutorial: hours/week
Practical: 6 hours/week
Lab: hours/week

Course description:
This course intends to impart basic knowledge and skills on electricity and bench works.

Course objectives:
After the completion of this course students will be able to:
1. Define electricity;
2. Familiarize with metal works;
3. Perform house wiring works.
4. Perform simple metal works.

Part I: Electricity

Total: 4hours /week
Lecture: 1 hour/week
Tutorial: hours/week
Practical: 3 hours/week

Course description:
This part of the course focuses on familiarization of electricity and its application. It intends to impart knowledge and skills on Electrical accessories, Electrical energy, Electric symbols, House appliances and building wiring.

Course objectives:
After the completion of this course, students will be able to:
1. Define electricity;
2. Identify electric symbols and accessories;
3. Identify tools/equipment and its safety requirement of wiring system;
4. Identify major components of electrical system and its installation procedure and
5. Connect lighting circuits and signal circuits.

Course Contents:

Theory

Unit 1: Electricity **[1 Hr.]**
- 1.1. Introduction
- 1.2.History of electricity
- 1.3.Generation of electricity
- 1.4.Scope of electricity
- 1.5.Types of current

Unit 2: Fundamentals of electric circuits **[4 Hrs.]**
- 2.1.Definition of voltage, current, resistance and their relationship
- 2.2.Types of conductors

2.3.Types of circuits
- 2.3.1. Series circuit
- 2.3.2. Parallel circuit

2.4 Measurement of current, voltage, resistance and power
- 2.4.1. Ampere meter
- 2.4.2. Volt meter
- 2.4.3. Ohm meter
- 2.4.4. Power meter/ Watt meter/Energy meter

2.5 Related numerical problems on circuits

Unit 3: Electrical Energy Transformation **[2 Hrs.]**

3.1.Transformer, its function and application
3.2.Isolator, its function and application
3.3.Electric poles, its function and application
3.4.Safety and precautions

Unit 4: Measuring Instruments and Protecting Devices **[1 Hr.]**

4.1.Foot and meter/scale (Linear measuring instruments)
4.2.Vernier caliper/caliper
4.3.Standard wire gauge
4.4.Feeler gauge/radius gauge
4.5.Micrometer/voltmeter
4.6.Miniature Circuit breaker (MCB)
4.7.Fuses and fuse types
4.8.Check line with color chalk dust powder
4.9.Straightedge and line

Unit 5: Source of Power **[2 Hrs.]**

5.1.Definition
5.2.D.C. system
5.3.A.C. system
5.4.Phases (single and three phases lines)
5.5.Inverter system
5.6.Solar power system

Unit 6: Electric Symbols **[1 Hr.]**

6.1.Introduction
6.2.Types of symbols
6.3.Identification
6.4.Application

Unit 7: Earthing **[2 Hrs.]**

7.1.Definition of electric shock
7.2.Effects of electric shock on human body
7.3.Levels of electric shock
7.4.Introduction of earthing
7.5.Function and application
7.6.Earthing methods and testing
7.7.Safety and precaution in earthing

Unit 8: Electric Wiring Procedure **[2 Hrs.]**

8.1.Marking procedure and interpolation of wiring diagram
8.2.Setting out back ground on wall surface
8.3.Drilling holes for fixing wire and cables and switch boxes
8.4.Fixing accessories components or position
8.5.Installation of wires/cables to masonry wall by placing safety foundation
8.6.Fixing PVC insulated wires and cables branching boxes using clips and saddles
8.7.Fixing accessories on position

Practical

Project 1: Draw/interpret Drawings and Diagrams: [5 Hrs.]

1.1 Simple electrical drawings
1.2 Free hand plan/schematic diagram
1.3 Layout diagram
1.4 Wiring diagram.

Project 2: Connect the following Lighting Circuits on Board: [32 Hrs.]

2.1.One-way switch one light and one socket [4 Hrs.]
2.2.Two-way switch two lights and two sockets [5hrs]
2.3. Intermediate switches, two fluorescent lamps [5 Hrs.]
2.4.Multi-position switches and incandescent lamps [7 Hrs.]
2.5.Dimmer switches and incandescent lamps. [7 Hrs.]
2.6.Time switches and lamps [4 Hrs.]

Project 3: Connect the following Signal Circuits: [8 Hrs.]

3.1.Electrical bell [2 Hrs.]
3.2.Electric door opener [3 Hrs.]
3.3. Ceiling fan with fan regulator [3 Hrs.]

References:

1. Malla, N.B., (latest edition). Introduction of Electricity volume 1.
2. Malice, S. K., (latest edition). Electric Trade Theory and Practical.

Evaluation Scheme

S.N.	Description	Time (hours)	Marks
1	Draw/Interpret drawings and diagrams	5	5
2	Connect lighting circuits on boards	32	25
3	Connect the signal circuits	8	5
4	Viva from theory		5
	Total		40

Part II: Bench work

Total: 4hours /week
Lecture: 1 hour/week
Tutorial: hours/week
Practical: 3 hours/week

Course Description:
This part of the course focuses on familiarization of bench work and its application. It intends to impart knowledge and skills on bench works techniques and metal tools making procedures.

Course Objectives:
After the completion of this course, students will be able to:

1. Introduce bench work;
2. Identify bench work tools and its types;
3. Classify the various techniques of metal joining processes by hand
4. Prepare general types of tools and equipment
5. Handle measuring instruments, hand tools, power tools with personal safety

Course Contents:

Unit 1: Bench work [1 Hrs.]

1.1 Introduction
1.2 Importance and its Application in Engineering work
1.3 Safety measures used in workshop

Unit 2: Lying Tools [2 Hrs.]

2.1 Introduction of layout tools: (scriber, punch, divider, surface plate, v-block, Vernier calliper and Vernier height gauge)
2.2 Types of layout tools
2.3 Handling procedure of layout tools
2.4 Repair and maintenance of the layout tools
2.5 Hammer/Hammering
  2.5.1 Introduction of the ball, cross, straight, claws and soft hammers.
  2.5.2 Selection of hammer for driving, chipping, punching, puling nails, riveting and fitting.
  2.5.3 Holding and replacing handle.
  2.5.4 Handling of hammering tools.
2.6 Wrenches
  2.6.1 Introduction to single, double, pipe and the adjustable wrenches
  2.6.2 Handling of wrenches
  2.6.3 Identification of bench, machine, pipe and chain vices.

Unit 3: Cutting tools [4 Hrs.]

3.1 Chisels
- Introduction to cross diamond and round chisels
- Selecting the angle of the chisels and removing metal from the surface
- Holding the hammer and chisel and chipping processes.
- Uses of the chipping guard, care and maintenance of work place and tools.

3.2 Handsaw and sawing
- Selection of hand saw, blade, cutting metal.
- Method of the holding the work piece and rules of sawing.

3.3 Files and filing
- Identification of the parts, shapes, sizes, cuts of the files.

- Selection of file for the shaping different types of the metal and surface finish with accuracy of +-0.2mm.
- Method of the holding, balancing and the direction of the filing

3.4 Reamer and reamering

- Types of the reamers, hand, taper and adjustable reamers
- Selection of holding device, reamer; drill speed.
- Method of reamering on the metal

3.5 Thread and threading

- Introduction to taps, dies, handle kinds of the thread, size, angle, main part of the thread and uses.
- Method of producing the thread by the taps and dies, lathe machine, rolling, pressing

3.6 Scraper and scraping

- Identification of flat, three side and curve scraper
- Method of the scraping and the qualities of the surface

Unit 4: Measuring instrument [1 Hr.]

4.1 Identification of Vernier calliper, micrometre, try square, bevel protractor, wire, and filler radius and thread gauge.

4.2 Parts of measuring instrument

4.3 Rules of the measuring instrument.

Unit 5: Rivet and Riveting [1Hr]

5.1 Identification of rivets, size, head, metal, riveting sets punches.

- Calculation of length, diameter of rivet and head.
- Procedure of the riveting and the joints mistakes.

Unit 6: Solder and Soldering [1 Hr.]

6.1 Introduction to soldering iron, types of solder, cleaning tools and the fluxes.

- Selection of source of heat and temperature
- Process of cleaning and joining work metal

Unit 7: Shear and shearing [1 Hr.]

- Identification of hands, press, torch, snip, shear tools.
- Selection of method of the shearing sheet, rod, and square, flat angle metal

Unit 8: Bend and bending [1 Hr.]

- Introduction to bending devices, vice pliers, range, hand bar and fork
- Selection of folding, radius bending and rolling devices
- Method of bending the metal bar, flat and the plate
- Bending the metal into many shapes

Unit 9: Power tools [2 Hrs.]

9.1 Drill machines

- Identification of hand drill machine, bench, gang, colon and radial drill machine.
- Selection of correct type of the machine
- Correct method of using the drilling machine
- Selection of correct speed and the fit for different size of the drill and the metal

9.2 Drill and drilling

- Identification of different kinds of drill size, purpose and angle
- Selection of work and drill, holding tools and equipment

- Operation of all types of drill machine of the drill holes of acceptable standards.
- Operation of the drill machines and the functioning by coolant

Unit 10: The sheet metal work **[1 Hr.]**

10.1 Hand tool metal

- Identification of types of the sheet metal, mild steel, galvanized steel, copper, brass, aluminum familiar with sizes and thickness of the sheet metals.
- Measurement of the sheet with gauge and instruments.

10.2 Marking tools

- Identification and uses of sheet metal marking tools, scriber, rules, try square, punch, divider, trammel and depth gauge.
- Selection of marking and sheet metal tools and uses such as the hand snipes, stacks, punch plat, hatchet, blow horn, hand punch, pop riveters fork devices, hammers, fly cutter, groove, seaming tools.

10.3 Power tools

- Identification of bending, rollers, folders, and edge forming, sawing, crimping, spot welding and polishing parts

Practical:

1. Perform straight, curve and dot marking: [1 Hr.]
2. Measure with rules, Vernier caliper, gauge [1 Hr.]
3. Perform hammering by ball, cross and soft straight pin. [1 Hr.]
4. Perform sawing by power hand saw. [2 Hrs.]
5. Perform filing with single, double and rasp cut. [2 Hrs.]
6. Perform chiseling by the flat, cross, concave and power chisel. [2 Hrs.]
7. Perform hand and adjustable reamering. [2 Hrs.]
8. Perform threading with tap and dies. [2 Hrs.]
9. Perform flat and curve scrapping on the metal surface [1 Hr.]
10. Perform riveting with riveting sets pup riveter [2 Hrs.]
11. Operate power tools for drilling, folding, rolling, radius bending, spot welding, grinding, beading, crippling, edge forming, hacksaw machines. [5 Hrs.]
13. Make hammer by using the skill of measuring, marking, sawing, filing, drilling, thread cut using a Tool steel 1 pc of size 25x25x155mm [12 Hrs.]
14. Make store box by using the skill of measuring, marking, hemming, seaming, cutting, folding, riveting using a G.I. sheet 22 gauge of 400x500 mm [12 Hrs.]

References:

1. Rajput, R.K., (latest edition). Manufacturing process.
2. Chaudhary, S.K., Chaudhary, A.K., Roy, N., (2007). Workshop technology manufacturing processes (Vol -1), Media Promoters &Publishers Pvt. Ltd.

Evaluation Scheme

S.N	Description	Time (hours)	Marks
1	Perform marking and measurement	2	4
2	Perform hammering or sawing	3	4
3	Perform filing or chiseling	4	8
4	Perform reamering or threading	4	8
5	Perform scrapping or riveting	3	4
6	Operate power tools	5	8
7	Viva from theory		4
	Total		40