

Lesson Plan

Name of the faculty: Sh. Vikas Goel, Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 4th Mechanical A & B

Subject: Hydraulics and Pneumatic

Lesson Plan Duration: 15 weeks (From January, 2020 to April, 2020)

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 03, practicals-02

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1 st	1 st	Introduction to Hydraulics and Pneumatics. Fluid, types of fluid	1 st	1. Measurement of pressure head by employing. i) Piezometer tube ii) Simple U-tube manometer iii) Bourdon.s tube pressure gaug
	2 nd	Properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity,	2 nd	2. Verification of Bernoulli's theorem.
	3 rd	Compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units. Simple numeric problems related to properties of fluids.		
2 ND	1 st	Concept of pressure, Intensity of pressure, static pressure and pressure head. Types of Pressure (Atmospheric Pressure, Gauge Pressure, Absolute Pressure).		3. Measurement of flow by using venturimeter.
	2 nd	Pressure measuring devices: Manometers and Mechanical Gauges		
	3 rd	Manometers: Piezometer, Simple U-tube Manometer, Micromanometer, Differential U-tube		

		Manometer, Inverted U-tube,		
3 RD	1 st	Manometers Construction, working and application including simple numerical problems.		4. To find out the value of coefficient of discharge for a venturimeter
	2 nd	Mechanical Gauges: Bourdon Tube pressure gauge, Diaphragm Pressure Gauge, Dead weight pressure gauge. Construction, working and application.		
	3 rd	Statement of Pascal's law and its applications.		
4 TH	1 st	revise numerical problems		5. To find coefficient of friction for a pipe (Darcy's equation).
	2 nd	revise numerical problems		
	3 rd	revise numerical problems		
5 TH	1 st	Types of fluid flow – Steady and Unsteady, Uniform and Non-uniform, Laminar and Turbulent; Rate of flow (Discharge) and its units		
	2 nd	Continuity Equation of Flow; Hydraulic Energy of a flowing fluid ; Total head		6. To study a single stage centrifugal pump and reciprocating pump for constructional details with the help of cut section models.
	3 rd	Bernoulli's Theorem statement (without proof) and its applications. Discharge measurement with the help of Venturimeter		
6 TH	1 st	Orifice meter, Pitot-tube, limitations of Bernoulli's theorem , simple numerical problems on above topics.		

	2 nd	Pipe and pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction		
	3 rd	Chezy's equation and Darcy's equation of head loss (without proof)		
7 TH	1 st	Reynold's number and its effect on pipe friction; Water hammer. Simple numerical problems on pipe friction.		
	2 nd	Nozzle - definition, velocity of liquid flowing through the nozzle, power developed		7. Study the working of Pelton wheel, Francis and Kaplan turbine with the help of working model.
	3 rd	revise numerical problems		
8 TH	1 st	revise numerical problems		
	2 nd	revise numerical problems		
	3 rd	revise numerical problems		
9 TH	1 st	Description, operation and application of – hydraulic press		8. Study of hydraulic circuit of any available machine or working model
	2 nd	hydraulic jack		
	3 rd	hydraulic accumulator		
10 TH	1 st	hydraulic brake		
	2 nd	hydraulic ram		
	3 rd	hydraulic door closer		
11 TH	1 st	Concept of hydraulic pump. Classification of pumps.		9. Study of pneumatic circuit of any available machine or working model
	2 nd	Construction, operation and application of Single acting reciprocating pump ,		
	3 rd	vane, screw and gear pumps.		
12 TH	1 st	Construction, operation and application of centrifugal pump		
	2 nd	Trouble shooting and problems in centrifugal pumps and remedial measure		

		s, pitting, cavitation, priming		
	3 rd	Concept of a turbine, classification of turbines		
13 TH	1 st	types of turbines - impulse and reaction type (concept only) difference between them.		
	2 nd	Construction and working of pelton wheel, Francis turbine		
	3 rd	Kaplan turbines.		
14 TH	1 st	Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system.		
	2 nd	Industrial applications of oil power hydraulic and pneumatic system.		
	3 rd	Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit. Hydraulic oils- Classification and their properties. Seals and packing- classification of seals, sealing materials.		
15 TH	1 st	Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures		
	2 nd	Basic Components of Pneumatic Systems , definition and functions of each component in a Pneumatic circuit. Necessity of Filter, Regulator and Regulator(FLR).		
	3 rd	Common problems in pneumatic systems. Maintenance schedule of pneumatic systems.		

Lesson Plan

Name of the faculty: Sh. Rajeev Verma, Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 4TH Mechanical A & B

Subject: Materials and Metallurgy

Lesson Plan Duration: 15 weeks (Jan 2020 to April 2020)

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 04, Practicals- 02

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1 st	1 st	Material, Engineering materials.	1 st	Classification of about 25 specimens of materials/ machine parts into i) Metals and non metals
	2 nd	History of material origin, Scope of Material Science.		
	3 rd	Overview of different engineering materials and applications	2 nd	ii) Metals and alloys
	4 th	Importance, Classification of materials, Difference b/w metals and non- metals.		
2 nd	1 st	Physical and mechanical properties of various materials.	1 st	iii) Ferrous and non ferrous metals
	2 nd	Present and future needs of materials.		
	3 rd	Various issues of Material Usage- Economical, Environment and Social.	2 nd	iv) Ferrous and non ferrous alloys.
	4 th	Overview of Biomaterials and Semiconducting materials.		
3 rd	1 st	Fundamentals: Crystalline solid and amorphous solid.	1 st	Given a set of specimen of metals and alloys; identify and indicate the various properties possessed by them.
	2 nd	Unit cell, space lattice, Arrangement of atoms in simple cubic crystals, BCC, FCC and HCP Crystals.		

	3 rd	No. of atoms per unit cell, Atomic packing factor, coordination number.	2 nd	Given a set of specimen of metals and alloys; identify and indicate the various properties possessed by them.
	4 th	Defects/ Imperfections, types and effects in solid materials.		
4 th	1 st	Deformation: overview of deformation behavior and its mechanisms.	1 st	a) Study of heat treatment furnace.
	2 nd	Elastic and plastic deformation		
	3 rd	Behaviour of material under load and stress- strain curve.	2 nd	a) Study of heat treatment furnace.
	4 th	Failure Mechanisms: overview of failure modes, fracture, fatigue and creep.		
5 th	1 st	Metallurgy: Introduction , cooling curves of pure metals, dendritic solidification of metals.	1 st	b) Study of a thermocouple/ pyrometer
	2 nd	Effect of grain size o mechanical properties		
	3 rd	Binary alloys, Thermal equilibrium diagrams.	2 nd	c) Study of a thermocouple/ pyrometer
	4 th	Lever rule, solid solution alloys.		
6 th	1 st	Ferrous Metals: Different iron ores	1 st	Study of a metallurgical microscope and a specimen polishing machine.
	2 nd	flow diagram for production of iron and steel.		
	3 rd	Allotropic forms of iron- alpha, delta, gamma.	2 nd	Study of a metallurgical microscope and a specimen polishing machine.
	4 th	Basic process of manufacturing of pig iron and steel- making.		
7 th	1 st	Cast Iron: Properties, types of cast Iron	1 st	To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials. i) Brass ii) copper iii) Cast Iron iv) Mild Steel v)HSS vi) Aluminum
	2 nd	Manufacture and their use.		

	3 rd	Steels: Plain carbon steels and alloy steel.	2 nd	To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials. i) Brass ii) copper iii) Cast Iron iv) Mild Steel v)HSS vi) Aluminum
	4 th	Classification of plain carbon steels,		
8 th	1 st	Properties of different types of plain carbon steels.	1 st	To anneal a given specimen and find out difference in hardness as a result of annealing.
	2 nd	Application of different types of plain carbon steels.		
	3 rd	Effect of various alloying elements on properties of steel.	2 nd	To anneal a given specimen and find out difference in hardness as a result of annealing.
	4 th	Uses of alloy steels.		
9 th	1 st	Non ferrous Materials: Properties	1 st	To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
	2 nd	Uses of copper		
	3 rd	Aluminum and their alloys.	2 nd	To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
	4 th	Definition and objectives of heat treatment.		
10 th	1 st	Iron carbon equilibrium diagram	1 st	To harden and temper a specimen and to find out the difference in hardness due to tempering.
	2 nd	Different microstructures of iron and steel.		
	3 rd	Formation and decomposition of Austenite	2 nd	To harden and temper a specimen and to find out the difference in hardness due to tempering.
	4 th	Martensitic Transformation.		
11 th	1 st	Various heat treatment processes- hardening.		
	2 nd	Tempering, Annealing, normalizing.		
	3 rd	Surface hardening, carburizing.		
	4 th	Nitriding, cyaniding. Hardenability of Steels.		

12 th	1 st	Types of heat treatment furnaces.		
	2 nd	Measurement of temperature of furnaces.		
	3 rd	Important of plastics, Classification- Thermoplastic and thermoset.		
	4 th	Plastic and their uses.		
13 th	1 st	Various trade names of plastics, plastic coatings, food grade plastics.		
	2 nd	Applications of plastics in automobile and domestic use.		
	3 rd	Rubber classification- Natural and synthetic. Selection of rubber.		
	4 th	Heat Insulating materials- Asbestos, glasswool, thermocole.		
14 th	1 st	Ceramics- Classification, Properties, applications.		
	2 nd	Refractory materials- Dolomite, porcelain.		
	3 rd	Glass- Soda lime, borosil.		
	4 th	Joining materials/ Adhesives- Classification, Properties and applications.		
15 th	1 st	Abrasive materials. Composites- Classification, properties, applications.		
	2 nd	Materials for bearing metals.		
	3 rd	Materials for Nuclear Energy.		
	4 th	Smart materials- properties and applications.		

Lesson Plan

Name of the faculty: Sh. Sandeep Dhandhi Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 4th Mechanical A & B

Subject: Workshop Technology-II

Lesson Plan Duration: 15 weeks (From January, 2020 to April, 2020)

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 03,

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1 st	1 st	Cutting Tools- Various types of single point cutting tools and their uses.		
	2 nd	Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect.		
	3 rd	Cutting speed, feed and depth of cut and their effect, Cutting Tool Materials- Properties of tool material.		
2 nd	1 st	Study of various cutting tool materials viz. High-speed, tungsten carbide, cobalt steel cemented carbides, satellite, ceramics and diamond.		
	2 nd	Principle of turning, Function of various parts of a lathe.		
	3 rd	Classification and specification of various types of lathe.		
3 rd	1 st	Work holding devices.		
	2 nd	Lathe tools and operations:- Plain and step turning, facing, parting off, taper turning.		
	3 rd	Eccentric turning, drilling, reaming, boring, threading.		
4 th	1 st	Knurling, form turning, spinning.		
	2 nd	Cutting parameters- speed, feed and depth of cut for various materials.		
	3 rd	For various operations, machining time.		
5 th	1 st	Speed ratio, preferred numbers of speed selection.		
	2 nd	Lathe accessories:- Centers, dogs different types of chucks		
	3 rd	Collets face plate, angle plate, and mandrel.		
6 th	1 st	Steady rest, follower rest, taper turning attachment.		
	2 nd	Tool post grinder, milling attachment, Quick change device for tools.		
	3 rd	Introduction to capstan and turret lathe.		

7 th	1 st	Principle to capstan and turret lathe.		
	2 nd	Classification of drilling machines and their description.		
	3 rd	Various operations performed on drilling machine-drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.		
8 th	1 st	Speeds and feeds during drilling, impact of these parameters on drilling, machining time.		
	2 nd	Types of drills and their features, nomenclature of a drill.		
	3 rd	Drill holding devices.		
9 th	1 st	Principle of boring.		
	2 nd	Classification of boring machines and their brief description.		
	3 rd	Boring tools, boring bars and boring heads.		
10 th	1 st	Working principle of shaper, planer and slotter.		
	2 nd	Type of shapers, Type of planers.		
	3 rd	Types of tools used and their geometry.		
11 th	1 st	Speeds and feeds in above processes.		
	2 nd	Broaching		
	3 rd	Types of broaching machines-Single ram and duplex ram horizontal type.		
12 th	1 st	Vertical type pull up, pull down, push down.		
	2 nd	Elements of broach tool, broach tooth details-nomenclature, types, and tool material.		
	3 rd	Importance and use of jigs and fixture		
13 th	1 st	Principle of location		
	2 nd	Locating devices		
	3 rd	Clamping devices		
14 th	1 st	Advantages of jigs and fixtures.		
	2 nd	Function of cutting fluid		
	3 rd	Types of cutting fluids		
15 th	1 st	Difference between cutting fluid and lubricant.		

	2 nd	Selection of cutting fluids for different materials and operations		
	3 rd	Common methods of lubrication of machine tools.		