

Discipline/Trade **MECHANICAL ENGINEERING**

Semester **Fourth**

Subject Name **Computer Aided Drafting**

Lesson Plan Duration: **15 WEEKS**

Work Load per week (in Hours) **Practical
04**

Week	Theory		
	Day	Topics to be covered (Including Assignments/Tests)	
1	(UNIT 1) Day1	Introduction to Computer Aided Drafting (2D) commands of any one software (Auto CAD, ProE, Solid works, Unigraphics etc.) Concept of AutoCAD, Tool bars in CAD software, coordinate system, snap, grid, and ortho mode (Absolute, Relative and Polar), setting of units and layout. Drawing commands – point, line, arc, circle, ellipse,	
	Day 1		Editing commands – scale, erase, copy, stretch, lengthen and explode. Dimensioning and placing text in drawing area
2	Day 1		Sectioning and hatching Inquiry for different parameters of drawing entity
	Day 1		
3	(UNIT 2) Day 1	Detail and assembly drawing of the following using Drafting Software Plummer Block Wall Bracket	
	Day 1		Stepped pulley, V-belt pulley Flanged coupling
4	Day 1	Machine tool Holder (Three views) Screw jack, joints, crank shaft and piston.	
	(UNIT 3) Day 1	Isometric Drawing by CAD using any part modeling Software (3D) Drawings of following on computer:- Cone, Cylinder	
5	Day 1	Cube, Spring, Isometric view of objects	

	(UNIT 4) Day 1		Introduction to any part modeling software (ProE, Solid works, AutoCAD, Uni Graphic, Catia etc.) Introduction to Sketcher: Sketch Entities, Sketch Tools, Blocks, Dimensioning Part modeling (4 models) Part Modeling Tools:- Creating reference planes Creating Extrude features Creating Revolve Creating Swept features Creating Loft features
6	Day 1		Creating Reference - points, axis, coordinates Creating curves Creating Fillet features Inserting Hole types Creating Chamfer
	Day 1		Creating Shell Creating Rib Environment & Utilities - Working with views and manipulating views. Create parts e.g. Piston, Pin, Bolts and Nuts, Fixture, Jig parts, Washer, Rings, Gaskets parts etc.
7	(UNIT 4.2) Day 1		Assembly and Simulation, Assembly Modeling Tools:- Introduction to Assembly Modeling & Approaches – Top down and Bottom up approach,
	Day 1		Applying Standard Mates- Coincident, Parallel, Perpendicular, Tangent, Concentric, Lock, Distance, Angle. Assemble of any two Mechanism e.g. Crank slider mechanism,
8	Day 1		Piston and Cylinder assembly, Quick Return Mechanism (QRM), Machine vices, Crank Shaft, Bearing assembly, any other mechanism.

Discipline/Trade **MECHANICAL ENGINEERING**
Semester **Fourth**
Subject Name **Hydraulic and Pneumatics**
Lesson Plan Duration **FIFTEEN WEEKS**
Work Load per week (in Hours) **Lecture -03 ,Practical -02**

Week	Lecture Day	Theory	Practical Day	Practical
		Topics to be covered (Including Assignments/Tests)		Practical Topic to be Covered
1	(UNIT 1)1	Introduction: Introduction to Hydraulics and Pneumatics. fluids, types of fluid; properties of fluid viz. mass density, weight density (specific weight), specific volume, capillarity, specific gravity and their units	(P-1)1	Measurement of pressure head by employing Piezometer tube
	2	Properties of fluid- viscosity, compressibility, surface tension and their units	2	
	3	Properties of fluid- kinematic viscosity and dynamic viscosity and their units, Numerical problems	3	
2	(UNIT 2)4	Pressure and its Measurement: Concept of pressure ,Intensity of pressure, static pressure and pressure head, Types of pressure(Atmospheric Pressure, gauge pressure, Absolute pressure)	4	Measurement of pressure head by employing Simple U-tube manometer
	5	Pressure measuring devices: Manometers- Piezometer, simple U-tube	5	
	6	Pressure measuring devices: Micromanometer, differential U-tube, Inverted U-tube,	6	
3	7	Manometer Construction, working and application of Bourdon pressure gauge	7	Measurement of pressure head by employing Bourdon's tube pressure gauge
	8	Simple numerical problems of Bourdon tube pressure gauge	8	
	9	Diaphragm pressure gauge, dead weight pressure gauge, Construction, working and applications, Statement of Pascal's law and its applications.	9	
4	10	Assignment of Unit 1,2	(P-2)10	Verification of Bernoulli's theorem.
	(UNIT 3)11	Flow of Fluids: Types of fluid flow – steady and unsteady, uniform and non- uniform, laminar and turbulent; rate of flow and their units	11	
	12	Continuity equation of flow, Hydraulic energy of a flowing fluid; total head	12	
5	13	Bernoulli's theorem (statement and and its applications), Discharge measurement with the help of venturi-meter,	(P-3)13	Measurement of flow by using venturimeter

	14	Discharge measurement with the help of orificemeter, Pitot tube	14	
	15	Limitations of Bernoulli's theorem, Simple Problems of flow of fluids	15	
6	16	Pipe and pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction	16	Revision of 1st and 2nd practical
	17	Chezy's equation and Darcy's equation of head loss (without proof)	17	
	18	Reynold's number and its effect on pipe friction; Water hammer	18	
7	19	Simple numerical problems on pipe friction	(P-4)19	To find out the value of coefficient of discharge for a venturimeter.
	20	Nozzle – definition, Velocity of liquid flowing through the nozzle, power developed	20	
	(UNIT 4)21	Hydraulic Machines: Description, operation and application of hydraulic press, hydraulic jack	21	
8	22	Description, operation and application of hydraulic accumulator and brake	(P-5)22	To find coefficient of friction for a pipe (Darcy's equation).
	23	Description, operation and application of hydraulic ram, hydraulic door closer	23	
	24	Revision of Unit 3,4	24	
9	25	Assignment/Test of Unit 3,4	(P-6)25	To study a single stage centrifugal pump and reciprocating pump for constructional details with the help of cut section models
	(UNIT 5)26	Pumps and Water Turbines: Concept of hydraulic pump, Classification of pumps	26	
	27	Construction, operation and application of Single acting reciprocating pump, vane, screw and gear pumps	27	
10	28	Construction, operation and application of centrifugal pump.	(P-7)28	Study the working of Pelton wheel, Francis turbine with the help of working model
	29	Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming	29	
	30	Concept of a turbine, classification of turbines,	30	
11	31	Types of turbines - impulse and reaction type (concept only), difference between Turbines	31	Study the working of Kaplan turbine with the help of working model
	32	Construction and working of pelton wheel	32	
	33	Construction and working of Francis turbine	33	
12	34	Construction and working of Kaplan turbine	(P-8)34	Study of hydraulic circuit of any available machine or working model
	(UNIT 6)35	Oil power Hydraulic and Pneumatic systems: Introduction to oil power hydraulics and pneumatic system.	35	
	36	Relative Merits and Demerits as oil power hydraulic and pneumatic system	36	
13	37	Industrial applications of oil power hydraulic and pneumatic system.	37	

	38	Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit.	(P-9)38	Study of pneumatic circuit of any available machine or working model
	39	Hydraulic oils- Classification and their properties. Seals and packing- classification of seals, sealing materials	39	
14	40	Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil	40	Revision of 4th and 5th practical
	41	Causes of contamination, preventive measures.	41	
	42	Basic Components of Pneumatic Systems, definition and functions of each component in a Pneumatic circuit, Necessity of Filter, Regulator and Regulator(FLR)	42	
15	43	Common problems in pneumatic systems.	43	Revision of 6th and 7th practical
	44	Maintenance schedule of pneumatic systems.	44	
	45	Assignment/Test of Unit 5,6	45	

	32	objectives and components (functions) of P.P.C
	33	Advantages of production planning
12	(UNIT 7)34	Production Planning and control: production and its types, batch and continuous
	35	Advantages, objective and components of production planning and production control, stages of P.P.C
	36	Process planning, routing, scheduling, dispatching, follow up
13	37	Routing purpose, route sheets, scheduling purpose, machine loading chart, dispatching – purpose, and procedure
	38	Structure and function of production, planning departments, Gantt chart.
	39	CPM/PERT technique, drawing of simple networks and critical time calculation.
14	40	Production control in job order, batch type and continuous type production, its difference
	41	Revision
	(UNIT 8)42	Store Management: different layout and structure of stores, inventory control
15	43	Calculations of EOQ, Bin cards
	44	various forms required in stores for documentation, purchase procedures
	45	Assignment/Test of unit 5,6

SUBJECT NAME	THERMODYNAMIC-II			
Branch	Mechanical Engineering	5th SEM		
CHAPTER SR.NO.	CHAPTER/UNIT NAME	SUBJECT SUBTOPIC SR.NO.	SUBJECT SUBTOPIC NAME	PRACTICAL NAME
1	IC ENGINE	1.1	Introduction	Dismantle an IC engine and various parts,
		1.2	Working principle of two stroke and four stroke cycle, SI engines and CI engines,	removal and fitting of piston, crank shaft ovality and assemble it.
		1.3	Location and functions of various parts of IC engines and materials used for them	rings, measuring of bore size,
2	Fuel Supply and Ignition System in Petrol Engine	2.1	Concept of carburetion	Dismantle a carburetor
		2.2	Air fuel ratio	
		2.3	Simple carburetor and its limitations and application.	Servicing of petrol injection system
		2.4	Description of battery coil and electro ignitionsystem, fault finding/ and	
		2.5		
		2.6	Description of petrol injection system	
3	Fuel System of Diesel Engine	3.1	Components of fuel system	Valve servicing, grinding
		3.2	Description and working of fuel feed pump	mechanism and tappet adjustment.
		3.4	Injectors	
4	Cooling and Lubrication	4.1	Function of cooling system in IC engine	Inspection of ignition system
		4.2	Air cooling and water cooling system, use of thermostat and radiator.	
		4.3	Function of lubrication	stressing ignition timings,
		4.4	Types and properties of lubricant	setting, fixing order and contact breaker;
		4.5	Lubrication system of engine	gap adjustment, spark plug cleaning.
4.6	Fault finding in cooling and lubrication and remedial action			
5	Testing of IC Engines	5.1	Engine power - indicated and brake power	Service of cooling & lub
		5.2	5.2 Efficiency - mechanical, thermal. relative and volumetric	note down the functioning/testing of variou

		5.3	5.3 Methods of finding indicated and brake power	
		5.4	5.4 Morse test for petrol engine	
		5.5	5.5 Heat balance sheet, simple numerical problems	Determination of BHP by dynamometer.
		5.6	Concept of pollutants in SI and CI engines	
6	Steam Turbines and Steam Condensers	6.1	Function and use of steam turbine	Morse test on multi-cylinder petrol engine.
		6.2	Steam nozzles - types and applications	
		6.3	Steam turbines - impulse, reaction, simple and compound, construction and working principle	
		6.4	Governing of steam turbines	Draw layout of modern a workshop .
		6.5	Function of a steam condenser, elements of condensing plant	
		6.6	Classification - jet condenser, surface condenser	
		6.7	Cooling pond and cooling towers	
7	Gas Turbines and Jet Propulsion	7.1	Classification, open cycle gas turbine and closed cycle gas turbine	
		7.2	Open cycle constant pressure gas turbines	
		7.3	Closed cycle gas turbines, PV and TS diagram and working	Local visit to roadways workshop.
		7.4	Principle of operation of ram-jet engine and turbo jet engine - a	
		7.5	Rocket engine - its principle of working and applications	

Govt. Polytechnic Nanakpur

Discipline : **Mechanical Engineering**
Semester : **4th**
Subject : **Workshop Technology-II**
Lesson Plan Duration: **15 Weeks**

Week	Theory	
	Lecture Day	Topic (Including assignment/test)
I	1	Cutting Tools and Cutting Materials
	2	Cutting Tools - Various types of single point cutting tools and their uses,
	3	Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect
	4	Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel,
II	5	tungsten carbide, cobalt steel cemented carbides, satellite, ceramics and diamond
	6	Lathe: Principle of turning
	7	Function of various parts of a lathe
	8	Classification and specification of various types of lathe
III	9	Classification and specification of various types of lathe
	10	Work holding devices
	11	Lathe tools and operations: - Plain and step turning, facing, parting off
	12	Assignment
IV	13	reaming, boring, threading, knurling, form turning, spinning
	14	Cutting parameters – Speed, feed and depth of cut for various materials
	15	Cutting parameters –

		for various operations, machining time.
V	16	Speed ratio, preferred numbers of speed selection
	17	Lathe accessories:- Centres, dogs, different types of chucks, collets,
	18	Lathe accessories:- face plate, angle plate, mandrel, steady rest, follower rest, taper turning
	19	tool post grinder, milling attachment, Quick change device for tools.
VI	20	Assignment
	21	Introduction to capstan and turret lathe
	22	Assignment on Chapter 1,2 and queries related to chapter 1st and 2nd
	23	Drilling: Principle of drilling.
	24	Classification of drilling machines and their description.
VII	25	Various operation performed on drilling machine – drilling, spot facing,
	26	reaming, boring, counter boring, counter sinking, hole milling, tapping.
	27	hole milling, tapping. Speeds and feeds during drilling, machining time.
	28	impact of these parameters on drilling
VIII	29	Types of drills and their features,
	30	nomenclature of a drill,
	31	Assignment
	32	Drill holding devices.
IX	33	Boring: Principle of boring
	34	Classification of boring machines and their brief description.
	35	Revision of Chapter 1

	36	Boring tools, boring bars and boring heads.
X	37	Shaping, Planning and Slotting:
	38	Working principle of shaper, planer and slotter
	39	Type of shapers
	40	Type of planers
XI	41	Types of tools used and their geometry.
	42	Speeds and feeds in above processes
	43	Broaching: Introduction, Types of broaching machines
	44	- Single ram and duplex ram
XII	45	horizontal type,
	46	vertical type pull up, pull down, push down.
	47	Elements of broach tool, broach tooth details - nomenclature, types, and tool material.
	48	Jigs and Fixtures: Importance and use of jigs and fixture
XIII	49	Principle of location
	50	Locating devices
	51	Clamping devices
XIV	52	Advantages of jigs and fixtures
	53	Cutting Fluids and Lubricants:
	54	Function of cutting fluid
	55	Assignment

	56	Types of cutting fluids
XV	57	Difference between cutting fluid and lubricant
	58	Selection of cutting fluids for different materials and operations
	59	Common methods of lubrication of machine tools
	60	Revision

Lesson Plan

Discipline : Mechanical Engg.
Semester : 4TH
Subject : M.M.
Lesson plan duration : 15 weeks

Week	Theory		Practical	
	Lecture Day	Topic (including assignments /tests)	Practical Day	Topic
Week1	1st	Introduction: Material, History of Material Origin,	1st	Classification of about 25 specimens of materials/machine parts into(i) Metals and non metals (ii) Metals and alloys / Practical Work
	2nd	Scope of Material Science, different engineering materials and applications	2nd	
	3rd	Classification of materials & difference between Metal & Non Metal		
	4th	Present and future needs of materials, Overview of Biomaterials and semiconducting materials		
Week2	1st	Various issues of Material Usage- Economical, Environment and Social.	1st	Given a set of specimen of metals and alloys (copper, brass, aluminum, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them. / Theory Work Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them. / Practical Work
	2nd	Assignment	2nd	
	3rd	Crystallography: Fundamentals: Crystal, Unit Cell, Space Lattice		
	4th	Arrangement of atoms in Simple Cubic Crystals		
Week3	1st	Arrangement of atoms in BCC	1st	Study of heat treatment furnace. / Theory Work
	2nd	FCC and HCP Crystals		
	3rd	Number of atoms per unit Cell, Atomic Packing Factor	2nd	Study of heat treatment furnace. / Practical Work
	4th	Revision		
	1st	Overview of deformation behaviour	1st	Study of a metallurgical microscope /

		and its mechanisms,	Theory Work
	2 nd	Behavior of material under load and	
Week4		stress-strain	

	3rd	Failure Mechanisms: Overview of failure modes,		
	4th	Fracture	2nd	Study of a metallurgical microscope / Practical work
Week5	1st	fatigue and creep.	1st	Study of Specimen polishing Machine / Theory Work
	2nd	Assignment		
	3rd	Metals And Alloys: Introduction: History and development of iron		
	4th	History and development of steel, Different iron ores,	2nd	Study of Specimen polishing Machine / Practical Work
Week6	1st	Introduction: History and development of iron	1st	To prepare specimens of following materials
	2nd	Basic Process of iron-making and steel-making,		
	3rd	Classification of iron	2nd	To prepare specimens of following materials for microscopic examination and
	4th	Classification of steel		
Week7	1st	Cast Iron: Different types of Cast Iron, manufacture and their usage.	1st	To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the
	2nd	Steels: Steels and alloy steel,		
	3rd	Classification of plain carbon steels	2nd	To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the
	4th	Availability, Properties and usage of different types of Plain Carbon Steels		
Week8	1st	Effect of various alloys on properties of steel,	1st	To anneal a given specimen and find out difference in hardness as a result of annealing. / Theory Work
	2nd	Uses of alloy steels (high speed steel, stainless steel,)		
	3rd	Uses of alloy steels (spring steel, silicon steel)	2nd	To anneal a given specimen and find out difference in hardness as a result of annealing. / Practical Work
	4th	Non Ferrous Materials: Properties and uses of Light Metals and their alloys		
Week9	1st	Properties and uses of White Metals and their alloys	1st	To normalize a given specimen and to find out the difference in hardness as a result of normalizing / Theory Work
	2nd	Assignment		
	3rd	Test	2nd	To normalize a given specimen and to find out the difference in hardness as a
	4th	Revision		
Week10	1st	Theory of Heat Treatment: Purpose of heat treatment	1st	Classification of about 25 specimens of materials/machine parts into (iii) Ferrous and non ferrous metals (iv)
	2nd	Solid solutions and its types,		
	3rd	Iron Carbon diagram,	2nd	Classification of about 25 specimens of materials/machine parts into (iii) Ferrous and non ferrous metals (iv)
	4th	Formation and decomposition of Austenite, Martensitic Transformation		
Week 11	1st	Simplified Transformation Cooling Curves	1st	To harden and temper a specimen and to find
	2nd	Processes hardening, tempering,		
	3rd	Annealing	2nd	To harden and temper a specimen and to find out the difference in hardness
	4th	Normalizing		
Week 12	1st	Case hardening	1st	Practice And VIVA VOCE
	2nd	Surface hardening		
	3rd	Types of heat treatment furnaces required for above operations	2nd	Practice And VIVA VOCE
	4th	Revision & Assignment		

Week 13	1st	Engineering Plastics: Important sources of plastic	1st	Practice And VIVA VOCE
	2nd	thermoplastic and thermo set and their uses		
	3rd	Various Trade names of engg. Plastics,	2nd	Practice And VIVA VOCE
	4th	Plastic Coatings		

Week 14	1 st	Advanced Materials: Composites- Classification, properties, applications	1 st	Practice And VIVA VOCE
	2 nd	Ceramics-Classification, properties, applications, Heat insulating materials		
	3 rd	Miscellaneous Materials: Properties and uses of Asbestos, Glass wool	2 nd	Practice And VIVA VOCE
	4 th	Thermocole cork, mica		
Week 15	1 st	Overview of tool and die materials, Materials for bearing metals,	1 st	Practice And VIVA VOCE
	2 nd	Spring materials		
	3 rd	Materials for Nuclear Energy, Refractory materials.	2 nd	Practice And VIVA VOCE
	4 th	Revision		

Govt Polytechnic, Nanakpur

Lesson Plan

Discipline : Mechanical Engineering

Semester : 4th

Subject : Soft Skills - II

Lesson plan duration : 15 weeks

** Work load(Lecture/Practical) per week (in hours) : **Practicals-02**

Week	Practicals	
	Practical day	Topic
1st	1st	Overview of the whole syllabus, students must be aware about the subject ,meaning and need of this subject and its practical implementation in their real day to day life activities
	2nd	Basic aspects need to be discussed and how to improve communication
	3rd	Practice to improve communication
2nd	4th	Repeation of previous lectuer
	5th	Concept of team building , Behavior in a team
	6th	Behavior in a team
3rd	7th	Activities based on team building to be done
	8th	Developing Interpersonal Relations- Empathy
	9th	Developing Interpersonal Relations-Sympathy
4th	10th	Students motivated to take part in day to day activities organised in college like Debate,declamation,stage conduction etc
	11th	How to improve communication skills
	12th	How to improve communication skills
5th	13th	How to improve non-verbal communication skills
	14th	Queries if any of students to be sort out
	15th	practice
6th	16th	Students motivated to take part in day to day activities organised in college to increase their confidence level
	17th	Conflict Management
	18th	Activities based on how to manage conflicts to be done
7th	19th	Activities based on how to manage conflicts to be done
	20th	Practice and Doubts if any of students to be discussed
	21st	Students motivated to take part in day to day activities organised in college like Debate,declamation,stage conduction etc

8th	22nd	Motivation
	23rd	Activities based on how to motivate ourself and others
	24th	Practice
9th	25th	Practice and Doubts if any of students to be discussed
	26th	Students motivated to take part in day to day activities organised in college like Debate, declamation, stage conduction etc
	27th	demonstration of various activities by students
10th	28th	Leadership
	29th	Activities based on Leadership
	30th	Activities based on Leadership
11th	31st	Practice and Doubts if any of students to be discussed
	32nd	What are professional Ethics and Values
	33rd	How to develop professional Ethics and Values
12th	34th	Their importance in life
	35th	Issues related to health
	36th	Issues related to Hygiene
13th	37th	Issues related to Cleanliness
	38th	Issues related to Safety
	39th	Extension Lecture
14th	40th	Students motivated to take part in day to day activities organised in college like Debate, declamation, stage conduction etc
	41st	Various activities to be done to implement and analyse above studied aspects
	42nd	Various activities to be done to implement and analyse above studied aspects
15th	43rd	Various activities to be done to implement and analyse above studied aspects
	44th	Various activities to be done to implement and analyse above studied aspects
	45th	Various activities to be done to implement and analyse above studied aspects