

Yamuna Polytechnic for Engineering, Gadholi

Lesson Plan for Even Semester 2018

Name of Faculty : Sh. Yogesh Bhardwaj

Discipline : Mechanical Engineering

Semester : IV

Subject: **Material and Metallurgy**

Lesson Plan Duration :

15 Weeks w.e.f 09/01/2018

Week	Theory		Practical	
	Lectuer Day	Topic (including assignment/test)	Practical Day	Topic
I	1	1. Introduction: Material, History of material origin, Scope of material science, Overview of different engineering materials and applications.	1	Classification of about 25 specimens of materials / machine parts into i) Metals and Non- Metals ii) Metals and Alloys iii) Ferrous and Non- Ferrous Metals iv) Ferrous and Non- Ferrous Alloys
	2	Classification of materials, Thermal properties		
	3	Chemical & Electrical Properties		
II	4	Mechanical Properties of various materials	2	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	5	Present and Future needs of materials, Overview of Biomaterials & Semiconducting materials.		
	6	Various issues of materials, usage- Economical, Environment and Social		
III	7	Crystallography Fundamental:-Crystal, Unit Cell, Space Lattice, arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals	3	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
	8	Number of atoms per unit cell		
	9	Atomic Packing Factor		
IV	10	Deformation:- Overview , Behaviour and its Mechanism	4	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	11	Behaviour of materials under load & stress strain		

	12	Failure mechanism:- Overview of failure modes, fracture, fatigue and creep		
V	13	3.Metals and Alloys: Introduction:- History and development of Iron & Steel, Different Iron Ores	5	Study of Heat Treatment Furnace
	14	Raw materials in production of Iron & Steel,		
	15	Basic process of Iron making Basic process of Iron making		
VI	16	Basic process of Steel making,	6	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	17	Classification of Iron And Steel.		
	18	Cast Iron:- Different types of Cast Iron , manufacture and their usage		
VII	19	Steels:- Steel & Alloy Steel, Classification of Plain Carbon Steel.	7	Study of a metallurgical microscope and a specimen polishing machine
	20	Availability , properties & usage of different types of Plain Carbon Steels.		
	21	Effect of various alloys on properties of steel, uses of alloy steel(HSS,SS)		
VIII	22	Spring steel, silicon steel,	8	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	23	Non ferrous materials		
	24	Properties and uses of light Metals and their alloys		
IX	25	Properties and uses of White Metals and their alloys	9	To prepare specimen for microscopic examination and to examine the microstructure of the specimens of following materials:i)Brass ii)Copper iii)Malleable iv)GreyCl v)Low carbon steel vi) high carbon steel vii)HSS

	26	4.Theory of Heat Treatment: Purpose of heat treatment, Solid solution and its type		
	27	Iron Carbon Diagram		
X	28	Formation and decompition of Austenite,	10	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	29	Martensitic Transformation-simplified transformation cooling curves		
	30	Various Heat Treatment Processes- Hardening, Tempering, Annealing		
XI	31	Normalizing, case Hardening	11	To anneal a given specimen and find out difference in hardness as a result of annealing
	32	Surface Haedening		
	33	Types of Heat Treatment Furnacesrequired for above operations(only basic idea)		
XII	34	5.Engineering Plastics: Important sources of plastics, Classification- thermoplastic and their uses	12	To normalize a given specimen and find out difference in hardness as a result of normalizing
	35	Thermosetting plastics and their uses		
	36	Various Trade names of engg. Plastics, Plastic Coating		
XIII	37	6.Advanced Materials: Composites- Classification, Properties, application	13	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	38	Ceramics- Classification, Properties, application		
	39	Heat Insulating Materials		
XIV	40	7.Miscellaneous Materials: Properties and uses of asbestos, Glass wool, Thermocole.	14	To harden and temper a given specimen and find out difference in hardness due to tempering
	41	Properties and uses of cork,mica. Overview of tool and die materials		
	42	Materials for bearing metals		
XV	43	Spring Materials	15	Final Viva- Voce
	44	Materials for nuclear energy		
	45	Refractory materials		

Yamuna Polytechnic for Engineering, Gadholi

Lesson Plan for Even Semester 2018

Name of Faculty : Sh. Gurpreet Singh

Discipline : Mechanical Engineering

Semester : IV

Subject: **Workshop Technology-II**

Lesson Plan Duration :

15 Weeks w.e.f

09/01/2018

Week	Theory		Practical	
	Lectuer Day	Topic (including assignment/test)	Practical Day	Topic
I	1	Cutting Tools and Cutting Materials Cutting Tools - Various types of single point cutting tools and their uses,		
	2	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		
	3	Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel,		
II	4	tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond		
	5	Lathe: Principle of turning		
	6	Function of various parts of a lathe		
III	7	Classification and specification of various types of lathe		
	8	Work holding devices		
	9	Lathe tools and operations :- Plain and step turning, facing, parting off		
IV	10	taper turning, eccentric turning, drilling,		
	11	reaming, boring, threading, knurling, form turning, spinning		
	12	Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.		
V	13	Speed ratio, preferred numbers of speed selection		
	14	Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning		
	15	tool post grinder, milling attachment, Quick change device for tools.		
VI	16	Introduction to capstan and turret lathe		
	17	Assignment on Chapter 1,2 and queries related to chapter 1st and 2nd		
	18	Drilling: Principle of drilling.		
VII	19	Classification of drilling machines and their description. Classification of drilling machines and their description.		
	20	Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.		
	21	Speeds and feeds during drilling, impact of these parameters on drilling, machining time.		
VIII	22	Types of drills and their features,		
	23	nomenclature of a drill,		
	24	Drill holding devices.		

IX	25	Boring: Principle of boring
	26	Classification of boring machines and their brief description.
	27	Boring tools, boring bars and boring heads.
X	28	Shaping, Planing and Slotting: Working principle of shaper, planer and slotter
	29	Type of shapers
	30	Type of planers
XI	31	Types of tools used and their geometry.
	32	Speeds and feeds in above processes
	33	Broaching: Introduction, Types of broaching machines – Single ram and duplex ram horizontal type,
XII	34	vertical type pull up, pull down, push down.
	35	Elements of broach tool, broach tooth details – nomenclature, types, and tool material.
	36	Jigs and Fixtures: Importance and use of jigs and fixture
XIII	37	Principle of location
	38	Locating devices
	39	Clamping devices
XIV	40	Advantages of jigs and fixtures
	41	Cutting Fluids and Lubricants: Function of cutting fluid
	42	Types of cutting fluids
XV	43	Difference between cutting fluid and lubricant
	44	Selection of cutting fluids for different materials and operations
	45	Common methods of lubrication of machine tools

Yamuna Polytechnic for Engineering, Gadholi

Lesson Plan for Even Semester 2018

Name of Faculty : Sh. Parvinder Singh

Discipline : Mechanical Engineering

Semester : IV

Subject: **Hydraulics & Hydraulic Machines**

Lesson Plan Duration :

15 Weeks w.e.f 09/01/2018

Week	Theory		Practical	
	Lectuer Day	Topic (including assignment/test)	Practical Day	Topic
I	1	1.Introduction: Fluid, types of fluid, properties of fluid viz mass density, wieght density(Specicific weight)	1	Measurement of pressure by Employing i) Piezometer Tube ii) Single & Double Column Manometer
	2	Specific Volume, Capillarity, Specific gravity, Viscosity, Compressibility		
	3	Surface Tension, Kinematic Viscosity Dynamic viscosity and their units		
II	4	2.Pressure & its Measurement: 2.1 Concept of Pressure (Atmospheric Presure, gauge Pressure, absolute Pressure)	2	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	5	Pascal's law, Static Pressure 2.2 Pressure measuring devices: Piezometer tube manometers-Simple U tube		
	6	Differential Single column Manometer		
III	7	Inverted U tube, Micromanometer including simple problems	3	To find out the value of coefficient of discharge for a venturimeter.
	8	Bourdon Pressure gauge, Diaphragm Pressure gauge		
	9	Dead Weight Pressure gauge		
IV	10	3. Flow of Fluids:Types of Fluid Flow- Steady and Unsteady, Uniform and non-uniform, laminar and Turbulent	4	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	11	Rate of flow and their units, Continuity Equation of Flow		

	12	Potential Energy of a flowing Fluid, total head		
V	13	Bernoulli's Theorem(Statement & proof) & its applications	5	Measurement of flow by using venturimeter.
	14	Discharge measurement with the help of Venturimeter.		
	15	Discharge measurement with the help of Orificemeter.		
VI	16	Pitot Tube, Limitation of Bernoulli's Theorem, Simple problem	6	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	17	4.Flow Through Pipes: Definition of pipe flow, wetted perimeter, Hydraulic mean depth, Hydraulic gradient, Loss of head due to friction		
	18	Chezy's equation and Darcy's equation of head loss (without proof)		
VII	19	Reynolds number and its effect on pipe friction, Siphon	7	Verification of Bernoulli's Theorem
	20	Nozzle- Definition, Velocity of liquid flowing through Nozzle, Power developed		
	21	Water Hammer, Anchor Block		
VIII	22	Syphon, Surge Tank (Concept only)	8	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	23	Loss of head in pipes due to sudden enlargement, due to sudden contraction,		
	24	Obstruction to flow path, change of direction & pipe fittings (without Proof)		
IX	25	5.Flow through orifices: Cc, Cv, Cd,	9	To study the hydraulic circuit of Hydraulic brakes & Hydraulic Ram.
	26	Flow through drowned, partially drowned orifice		
	27	Time required for emptying a tank through circular orifice		
X	28	Simple numerical problems on flow through orifice	10	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	29	6.Hydraulic Machines:Description, operation and application of Hydraulic system -Hydraulic Ram, Hydraulic Jack		

	30	Hydraulic Brake, Hydraulic Accumulator		
XI	31	Hydraulic Door closer, Hydraulic Press,	11	Study the working of Pelton Wheel Turbine & Francis Turbine
	32	Selection of specification of above systems for different applications		
	33	7. Water Turbines and Pumps: Concept of a turbine, types of turbine-Impulse & reaction (Concept only)		
XII	34	Difference between Impulse & Reaction Turbine	12	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	35	Construction & working of Pelton Wheel Turbine		
	36	Construction & working of Francis Turbine		
XIII	37	Construction & working of Propeller and Kaplan Turbine	13	To study single stage centrifugal pump for constructional details & its operation to find out its normal head and discharge.
	38	Unit speed, unit power, unit discharge,		
	39	Specific speed of Turbine, Selection of turbines based on specific speed		
XIV	40	Concept of Hydraulic Pump, single acting reciprocating pump (construction & operation only)	14	Checking of files and Viva Voce and remedial measures regarding the practical performed (If any)
	41	Vane, Screw and Gear Pumps		
	42	Construction, working & operation of Centrifugal Pumps.		
XV	43	Performance, Efficiencies and specifications of a Centrifugal Pump	15	Final Viva-Voce
	44	Trouble shooting & problems in Centrifugal Pumps.		
	45	Vane, Screw and Gear Pumps		

Yamuna Polytechnic for Engineering, Gadholi

Lesson Plan for Even Semester 2018

Name of Faculty : Sh. Yogesh Bhardwaj

Discipline : Mechanical Engineering

Semester : IV

Subject: **MACHINE DESIGN AND DRAWING (Theory & Practical)**

Lesson Plan Duration : 15 Weeks w.e.f 09/01/2018

Week	Theory		Practical	
	Lectuer Day	Topic (including assignment/test)	Practical Day	Topic
I	1	Introduction to Design Design Defination-Types of Design Nesseacity of Design	1	Design terminology: stress, strain, factor of safety, factors affecting factor of safety
	2	Comparison of designed and undesigned work General Design Prodecure	2	Some Numerical Problems on Stress, Starin and F.O.S.
II	3	General Design Consideration	3	Stress Concentration, Methods to Reduce Stress Concentration,
	4	Codes and Standards (BIS Standards)	4	Fatigue and Endurance limit.
III	5	Engineering materials and their Mechanical properties:	5	Some Numerical Problems on Stress concentration
	6	Selection of Materials	6	Properties of engineering materials: elasticity, plasticity, malleability, ductility, toughness, hardness and resilience. Fatigue, creep, tenacity, strength
IV	7	Criterion of Material Selection	7	Some case Studies on Selection of Material
	8	Design Failure Theories, Introduction & Importance	8	Maximum stress theory With simple Numericals
V	9	Maximum strain theory	9	Simple Numerical Problems on Maximum Strain Theory
	10	Maximum Strain Energy Theory	10	Simple Numerical Problems on Maximum Strain Energy Theory
VI	11	Classification of Loads	11	Simple Numerical Problems for tensile and Compressive loads

	12	Design under Tensile, Compressive and Torsional loads.	12	Simple Numerical Problems for Torsional loads
VII	13	Introduction to Shafts, Types of Shafts and Materials of Shafts	13	Elaboration on Types of loading with Numericals
	14	Type of loading on shaft, standard sizes of shaft available	14	Class Work And Assignment Checking
VIII	15	Shaft subjected to torsion only determination of shaft diameter (hollow and solid shaft) on the basis of : Strength and Rigidity	15	Design of Shafts Subjected to Torsion only(Numericals)
	16	Determination of shaft dia (hollow and solid shaft) subjected to bending	16	Design of Shafts Subjected to Bending Moment only (Numericals)
IX	17	Determination of shaft dia (hollow and solid shaft) subjected to combined torsion and bending	17	Design of Shafts Subjected to Torsion and Bending moments Both(Numericals)
	18	Review of Design of Shaft and Address Students Queries related to Chapter 1 to 3.	18	Design of Shafts Subjected to Torsion and Bending moments Both(Numericals)
X	19	Types of key, materials of key, functions of key	19	Failure of key (by Shearing and Crushing) with Numerical Problems
	20	Design of key (Determination of key dimension)	20	Design of Key Numerical Problems
XI	21	Introduction to Screw Joints, Advantages and Disadvantages of screw joints, location of screw joints.	21	Effect of keyway on shaft strength. (Numerical problems).
	22	Important terms used in screw threads, designation of screw threads	22	Design of power screws (screw jack)
XII	23	Initial stresses due to screw up forces, stresses due to combined forces	23	Design of power screws (screw clamp)
	24	Problems and Queries Related to Screw Joints.	24	Draw Profile of cams for Uniform motion with knife edge and roller followers
XIII	25	Introduction to Cams and Follower, Types of cams and followers and their applications	25	Draw Profile of cams for SHM with knife edge and roller followers (Offset)

	26	Procedure to Draw the Cam Profile (Revision)	26	Draw Profile of cams for Uniformly Accelerated & retarded motion with knife edge and roller followers
XIV	27	Introduction to Gears , Type of Gears, Nomenclature of gears, Advantages of gears Drive	27	Drawprofile of involute teeth gear by approximate method
	28	Conventional Representation of Gears Drawing procedure of Gear tooth profile	28	Drawprofile of involute teeth gear by Tracing/exact method
XV	29	Address Students Queries related to Chapter 4 to 6.	29	Viva- Voce
	30	Checking of Assignment-II and Drawing Sheets	30	

Yamuna Polytechnic for Engineering, Gadholi

Lesson Plan for Even Semester 2018

Name of Faculty : Sh. Kulbhushan Sharma

Discipline : Mechanical Engineering

Semester : IV

Subject: **I.C. Engines**

Lesson Plan Duration :

15 Weeks w.e.f 09/01/2018

Week	Theory		Practical	
	Lectuer Day	Topic (including assignment/test)	Practical Day	Topic
I	1	Introduction I.C. Engines ,its Types & Classifications	1	Study of a two stroke engine using cut section model, note the function and Material of each part.
	2	Working principle of two stroke cycle.		
	3	Working principle of four stroke cycle.		
II	4	SI engines and CI Engines	2	Checking of practical copy/ viva/Revision.
	5	Working of Otto cycle, and Diesel cycle.		
	6	Working Principle of Dual cycle.		
III	7	Location and functions of various parts of IC engines.	3	Study of a four stroke engine using cut section model. Note the function of each Part.
	8	Materials used for various parts of IC engines.		
	9	Concept of IC engine terms: bore, stroke, dead centre, crank throw, compression ratio, piston displacement, piston SPEED		
IV	10	Concept of carburetion.	4	Checking of practical copy/ viva/Revision
	11	Air fuel ratio.		
	12	Simple carburetor and its application.		
V	13	MPFI, Common rail system.	5	Study of battery ignition system of a multi-cylinder petrol engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment.
	14	super charging and turbo charger.		
	15	SESSIONAL TEST -1/ ASSIGNMENT-1		
VI	16	SESSIONAL TEST-1 / ASSIGNMENT-1	6	Checking of practical copy/ viva/Revision
	17	Components of fuel system.		
	18	Description and working of fuel feed pump.		

VII	19	Fuel injection pump.	7	Study of cooling of IC engine.
	20	Various types of Injectors.		
	21	Description of battery coil ignition system.		
VIII	22	Magnet ignition system	8	Study of lubricating system of IC engine.
	23	Electronic ignition system.		
	24	Fault finding in ignition system.		
IX	25	remedial action for ignition system	9	Checking of practical copy/ viva/Revision
	26	SESSIONAL TEST -2/ ASSIGNMENT-2		
	27	SESSIONAL TEST -2/ ASSIGNMENT-2		
X	28	Function of cooling system in IC engine.	10	Determination of BHP by dynamometer.
	29	Air cooling and water cooling system.		
	30	use of thermostat and radiator.		
XI	31	forced circulation in water cooling (description with line diagram).	11	Checking of practical copy/ viva/Revision
	32	Function of lubrication.		
	33	Types and properties of lubricant.		
XII	34	Lubrication system of engine.	12	Morse test on multi-cylinder petrol engine.
	35	Fault finding in cooling and lubrication and remedial action.		
	36	Engine power - indicated and brake power.		
XIII	37	Efficiency - mechanical, thermal.	13	Checking of practical copy/ viva/Revision
	38	Efficiency - relative and volumetric.		
	39	Methods of finding indicated and brake power.		
XIV	40	Morse test for petrol engine.	14	Local visit to roadways or private automobile workshops.
	41	Heat balance sheet.		
	42	Concept of pollutants in SI and CI engines, pollution control.		
XV	43	norms for two or four wheelers BIS – I, II, III and iv	15	Checking of practical copy/ viva/Revision.
	44	methods of reducing pollution in IC		
	45	SESSIONAL TEST -3 ASSIGNMENT-3		

