

LESSON PLAN

Name of Faculty: SUKH DARSHAN

Discipline: AUTOMOBILE ENGG.

Semester: IV

Subject: MATERIALS AND METALLURGY

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS

Week	THEORY		PRACTICAL	
	Lecture DAY	TOPIC	Practical DAY	TOPIC
1 ST	1	UNIT 1: Introduction Material, History of Material Origin, Scope of Material Science	1	Classification of about 25 specimens of materials/machine parts into (i) Metals and non metals (ii) Metals and alloys
	2	Overview of different engineering materials and applications		
	3	Classification of materials		
2 ND	4	Thermal and chemical properties of materials	2	Classification of about 25 specimens of materials/machine parts into (i) Ferrous and non ferrous metals (ii) Ferrous and non ferrous alloys
	5	Electrical and mechanical properties of materials		
	6	Future need of materials, Overview of Biomaterials and semi-conducting materials		
3 RD	7	Various issues of Material Usage - Economical, Environment and Social	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	UNIT 2: Crystallography Fundamentals: Crystal, Unit Cell, Space Lattice		
	9	Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell		
4 TH	10	Atomic Packing Factor, Overview of deformation behaviour and its mechanisms	4	Continued....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
	11	Behaviour of material under load and stress-strain.		
	12	Failure Mechanisms: Overview of failure modes, fracture, fatigue and creep		
5 TH	13	Sessional Test- 1	5	Study of heat treatment furnace
	14	UNIT 3: Metals And Alloys Introduction: History and development of iron and steel, Different iron ores		

	15	Raw Materials in Production of Iron and Steel, Basic Process of iron-making and steel-making		
6 TH	16	Classification of iron and steel	6	Study of a metallurgical microscope and a specimen polishing machine
	17	Cast Iron: Different types of Cast Iron, manufacture and their usage		
	18	Cast Iron manufacture and their usage		
7 TH	19	Steels: Steels and alloy steel, Classification of plain carbon steels	7	To prepare specimens of following materials for microscopic examination and to Examine their microstructure (iii) Grey (iv) Malleable (v)Low carbon steel (vi)High carbon steel (vii) HSS
	20	Availability, Properties and usage of different types of Plain Carbon Steels		
	21	Effect of various alloys on properties of steel		
8 TH	22	Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel)	8	To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of (i) Brass (ii) Copper
	23	Non Ferrous Materials: Properties and uses of Light Metals and their alloys		
	24	Properties and uses of White Metals and their alloys.		
9 TH	25	Sessional Test- 2	9	To measure hardness of a given specimen and anneal it.
	26	UNIT 4: Theory of Heat Treatment Purpose of heat treatment, Solid solutions and its types		
	27	Iron Carbon diagram,		
10 TH	28	Formation and decomposition of Austenite	10	To find out the difference in hardness as a result of annealing
	29	Martensitic Transformation – Simplified Transformation, Cooling Curves		
	30	Various heat treatment processes - hardening and tempering,		
11 TH	31	Various heat treatment processes - annealing and normalizing	11	To measure hardness of a given specimen and normalize it.
	32	Various heat treatment processes - Case hardening and surface hardening		
	33	Types of heat treatment furnaces		
12 TH	34	UNIT 5: Engineering Plastics Important sources of plastics, Classification	12	To find out the difference in hardness as a result of normalizing
	35	Thermoplastic and thermo set; their uses		
	36	Various Trade names of engineering Plastics, Plastic Coatings		
13 TH	37	UNIT 6: Advanced Materials Composites-Classification, properties and applications	13	To measure hardness of a given specimen and harden & temper it.
	38	Ceramics-Classification, properties and applications		
	39	Heat insulating materials		
14 TH	40	UNIT 7: Miscellaneous Materials Properties and uses of Asbestos and Glass wool	14	To find out the difference in hardness as a result of hardening and tempering
	41	Properties and uses of thermocole, cork, mica		
	42	Overview of tool and die materials, Materials for bearing metals		
15 TH	43	Spring materials, Materials for Nuclear Energy	15	Viva voce and final evaluation
	44	Refractory materials		
	45	Sessional Test- 3		

LESSON PLAN

Name of Faculty: VISITING FACUALITY

Discipline: AUTOMOBILE ENGG.

Semester: IV

Subject: MECHANICS OF VEHICLES

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 4 PERIODS

WEEK	THEORY	
	LECTURE NO.	TOPIC
1 ST	1	UNIT 1: Simple Mechanism Definition of link, kinematic pair
	2	Kinematic chain, Mechanism
	3	Inversions and machines.
	4	Simple examples of mechanism with Lower pairs, Higher pairs
2 ND	5	Simple examples of mechanism with Four bar chain
	6	Simple examples of mechanism with Slider crank chain
	7	Simple examples of mechanism with Double slider crank chain
	8	UNIT 2: Motion and Turning Moment Displacement, velocity and acceleration of piston
3 RD	9	Angular velocity and angular acceleration of connecting rod
	10	Calculations of piston effort and crank effort at different angles
	11	Fly wheel - its types, weight and moment of inertia
	12	Fluctuation of energy for fly wheel
4 TH	13	Turning moment diagrams with reference to internal combustion engines.
	14	Analysis of Hooke's Joint.
	15	Sessional Test-1
	16	UNIT 3: Power Transmission Flat belt, V-belt and chain drives
5 TH	17	Ratio of tension of two sides of the belt with and without centrifugal tension
	18	Horse power transmitted and condition for maximum horse power transmitted
	19	Velocity ratios transmitted by Belts
	20	Simple and compound gear boxes
6 TH	21	Epicyclic gear box.
	22	UNIT 4: Vehicle in Motion - Air, grade, and rolling resistances
	23	Tractive effort, traction,
	24	Inertia load, Draw bar pull

7 TH	25	Power required to proper a vehicle
	26	Calculations of acceleration and tractive effort required in case of front wheel drive
		Calculations of acceleration and tractive effort required in case of rear wheel drive and four wheel drive
	28	Centrifugal force and its effect on vehicle stability on banked road.
8 TH	29	Centrifugal force and its effect on vehicle stability on unbanked road.
	30	UNIT 5: Vehicle Control
		Braking friction and limits of braking
		Retardation and Braking force, calculations in case of front wheel,
32	Retardation and Braking force, calculations in case of rear wheel and all wheel braking.	
9 TH	33	Weight transfer during braking
	34	Stopping distance and stopping time
	35	Davis and Ackermann Steering Mechanism
	36	Correct Steering angle
10 TH	37	Sessional Test-2
	38	UNIT 6: Balancing
		Concepts of static and dynamic balancing,
		working of static balancing machine.
40	working of dynamic balancing machine.	
11 TH	41	Balancing of rotating masses-single rotating mass by a single mass rotating in the same plane
	42	Balancing of rotating masses by two masses rotating in different planes
	43	Numerical problems, Allot home assignment
	44	balancing of several masses rotating in the same plane
12 TH	45	Balancing of several masses rotating in different planes.
	46	Balancing of several masses rotating in different planes.
	47	Numerical problems
	48	Checking home assignment
13 TH	49	UNIT 7: Vibration
	50	Introduction, Types of vibrating motion,
		Types of free vibrations
		Natural Frequency of Free longitudinal Vibrations
52	Natural frequency of free, Transverse vibrations	
14 TH	53	Numerical problems, Home assignment
	54	Causes of vibration in rotating bodies
	55	damping of vibrations
	56	Free damped vibrations (Vacuum Damping)
15 TH	57	Checking of home assignment
	58	Checking of class work
	59	Revision of syllabus, problem solving
	60	Sessional Test-3

LESSON PLAN

Name of Faculty: MANJIT(THEORY+PRACTICAL)

Discipline: Automobile engineering

Semester: 4th

Subject: Auto Engine-I

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: Lecture-04, Practical -04

WEEK	THEORY		PRACTICAL	
	LECTURE DAY	TOPIC	PRACTICAL DAY	TOPIC
1 ST	1	UNIT-1.Introduction of Engine (12 hrs)	1	Servicing of fuel systems in petrol engines
	2	Engine as a power source		
	3	Concept of internal combustion engine		
	4	Engine dimensions: Bore, stroke, dead centers, compression ratio		
2 ND	5	Clearance volume, engine capacity,	2	Servicing of lubricating system
	6	Engine torque engine power shaft		
	7	Classification of engines as per stroke, cycle,		
	8	Classification of engines as per fuel, ignition, cooling number		
3 RD	9	Arrangement of cylinders, reciprocating and rotary	3	Servicing of fuel injector
	10	Concept of 2 stroke and 4 stroke engines and their comparison.		
	11	Working principles of petrol		
	12	Working principles of diesel engines		
4 TH	13	UNIT-2.Constructional details Constructional details of cylinder block	4	Viva
	14	Cylinder head		
	15	Cylinder liner piston		
	16	Sessional Test-1		
5 TH	17	Piston rings,gudgeon pin	5	Servicing of F.I.P (Fuel Injection Pump)
	18	Connecting rod		
	19	Camshaft		
	20	Valve mechanisms		
6 TH	21	Flywheel and damper	6	Engine tune up
	22	Crankshaft		
	23	EVALUATION		

	24	UNIT-3.Fuel System Fuel system in spark ignition engine: Fuel feed system		
7 TH	25	Fuel pumps-its types	7	Viva
	26	Fuel tank, fuel lines		
	27	Fuel filters		
	28	Concept of carburetion. Working and construction of a simple carburetor		
8 TH	29	Advantages of using fuel injection system in spark ignition engines	8	Servicing of cooling system
	30	Concept of MPFI system		
	31	Constructional details of an MPFI system		
	32	Working of MPFI System		
9 TH	33	Dry and wet air cleaners	9	Study of turbocharger
	34	Concept VVT technology		
	35	UNIT-4.Ignition System in S.I. Engine Concept of ignition system		
	36	Battery and magneto types of ignition systems		
10 TH	37	Function of ignition coil	10	Viva
	38	Condenser		
	39	Contact breaker point		
	40	Distributors		
11 TH	41	Spark plugs	11	Study of engine block
	42	Distribution less ignition system.		
	43	Electronic ignition system		
	44	Sessional Test-2		
12 TH	45	UNIT-5.Cooling System Necessity of cooling system	12	Servicing of fuel system in diesel engine
	46	Air cooling		
	47	Water cooling system		
	48	Components of water cooling system- Radiators		
13 TH	49	Thermostat	13	Viva
	50	Water pump		
	51	Fan, Pressure cap ,Water jackets		
	52	Antifreeze solution.		
14 TH	53	Trouble shooting	14	Study of M.P.F.I engine
	54	UNIT-6.Lubrication System Necessity of lubrication system, pressure lubrication system		
	55	Splash lubrication. Components of lubrication system-oil pump		
	56	Oil lines, Oil filters, Oil coolers		
15 TH	57	Classification and service ratings of lubricating oil	15	Viva
	58	Additives for lubricants		
	59	Sessional Test-3		
	60	EVALUATION		

LESSON PLAN

Name of Faculty: **INDERJEET SINGH (4th Theory & Practical)**

Discipline: **AUTOMOBILE ENGG.**

Semester: **IV**

Subject: **MANUFACTURING TECHNOLOGY - II**

Lesson plan Duration: **15 WEEKS**

Work Load (Lecture/Practical) per week: **4 PERIODS**

WEEK	THEORY		PRACTICAL	
	LECTURE DAY	TOPIC	PRACTICAL DAY	TOPIC
1 ST	1	UNIT I: Drilling and Boring Introduction, Types of drills	1	Introduction to drilling and boring machines, an exercise of simple drilling and boring operation, selection of speeds and feeds, use of jigs and fixtures and coolant
	2	Types of drilling machines i.e. portable, bench type, pillar and radial,		
	3	Drilling speeds and feeds, drill chucks and other accessories (jigs etc.) used in drilling machines		
	4	Reaming, introduction to boring,		
2 ND	5	Types of boring machines – horizontal and vertical, specifications,	2	Job Practice
	6	Boring bar and boring heads		
	7	Revision and copy checking classwork and home assignment		
	8	UNIT II: Machining Processes Types of milling machines		
3 RD	9	Milling machines operations	3	Simple exercises on shaper
	10	Speeds and feeds,		
	11	Indexing (simple and compound)		
	12	Types of milling cutters		
4 TH	13	Planing machines types	4	Simple exercises on shaper
	14	Planing machine operations		
	15	Grinding principle		
	16	Cylindrical, centreless grinding		
5 TH	17	Surface grinding machines	5	Practice on horizontal and vertical milling machines, work holding devices and types of milling cutters
	18	Types of grinding wheels		
	19	Grinding wheel specifications, grades and their selection		
	20	Balancing of grinding wheels and their storage		

6 TH	21	Sessional Test-1	6	Job Practice
	22	UNIT III: Finishing Operations Lapping and its applications		
	23	Honing and its applications		
	24	Super finishing operation and its applications		
7 TH	25	Types of abrasives used and their selection	7	Practice on cylindrical and centreless grinding machine, selection, dressing and storage of grinding machines. Use of lubricants
	26	Revision and copy checking classwork and home assignment		
	27	UNIT III: Gear Production Gear cutting		
	28	Gear shaving machines		
8 TH	29	Gear cutters and coolants	8	Practice on cylindrical and centreless grinding machine, selection, dressing and storage of grinding machines. Use of lubricants
	30	Revision and copy checking classwork and home assignment		
	31	UNIT IV: CNC Machines Introduction to CNC		
	32	CNC control systems		
9 TH	33	Advantages of CNC	9	Practice on honing machines with selection of honing sticks, honing and finish pattern in the bore.
	34	Productivity, accuracy and cost		
	35	Revision and copy checking classwork		
	36	Home assignment		
10 TH	37	UNIT V: Bending and Forming Description of press brakes	10	Practice on honing machines with selection of honing sticks, honing and finish pattern in the bore
	38	Bending dies, forming machines		
	39	Sessional Test-2		
	40	Revision and copy checking classwork and home assignment		
11 TH	41	UNIT VI: Welding Introduction,	11	Observe working of CNC machines including setting of cutting parameters and dimensions and loading of tools.
	42	Types of welding		
	43	Gas welding		
	44	Arc welding		
12 TH	45	Arc welding continued	12	Observe working of CNC repeatability of operation and adjustment for wear allowances
	46	Resistance welding		
	47	Butt welding, flash welding		
	48	Projection, seam and spot welding		
13 TH	49	Selection of electrodes	13	Visit to industry (sheet metal shoes) to observe bending and forming operation and use of dies
	50	Filler metals		
	51	Types of welding defects and their remedies,		
	52	Soldering process and applications		
14 TH	53	Brazing process and applications	14	Use of appropriate coolant and lubricants for all machining operation in the workshop and during Industrial visits
	54	Special welding processes for stainless steel and aluminium		
	55	Revision and copy checking classwork and home assignment		
	56	UNIT VI:		

		Types of Coolants for various machining processes		
15TH	57	Types of Lubricants for various machining processes	15	Viva-voce and evaluation
	58	Revision and copy checking classwork and home assignment		
	59	Sessional Test-3		
	60	EVALUATION		

LESSON PLAN

Name of Faculty: VISITING FACUALITY

Discipline: AUTOMOBILE ENGINEERING

Semester: IV

Subject: CHASSIS, BODY AND TRANSMISSION

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 4 PERIODS

Week	Theory		Practical	
	Lecture Day	Topic	Practical Day	Topic
1 ST	1	UNIT 1: CHASSIS AND BODY Classification of vehicles	1	Study and sketches of Light vehicle chassis.
	2	Types of chassis, layout of conventional type of chassis		
	3	Function and arrangement of major assemblies		
	4	Alternate arrangement used such as engine position, drive types, their merits and demerits		
2 ND	5	Types of frame, materials of frame	2	Identify and servicing of single plate clutch
	6	Types of body		
	7	Cross members, brackets, body streamlining		
	8	Body upholstery		
3 RD	9	UNIT 2: CLUTCH Necessity of clutch,	3	Study and sketches of Heavy vehicle chassis.
	10	Requirements of a good clutch		
	11	Types of clutch		
	12	Construction, principle and working of single plate clutch		
4 TH	13	Construction, principle and working of multi plate clutch	4	Identify and servicing of multi plate clutch
	14	Hydraulic power assisted clutch; wet and dry plate clutch		
	15	Clutch plate construction, clutch lining material		
	16	Construction, principle and working of centrifugal clutch		
5 TH	17	Construction, principle and working of semi centrifugal clutch	5	Study and sketch of centrifugal clutch
	18	Construction, principle and working of fluid coupling		
	19	Sessional Test-1		
	20	UNIT 3: TRANSMISSION Necessity and function of transmission, types of manual transmission		

6 TH	21	Construction and working of sliding mesh gear box	6	Servicing and overhauling of sliding mesh gear box
	22	Construction and working of constant mesh gear box,		
	23	Construction and working of synchromesh gear box		
	24	Description and operation of transfer gear box		
7 TH	25	Types of automatic transmission and their main components	7	Servicing and overhauling of constant mesh gear box
	26	Epicyclic gear box – construction, working, overdrive		
	27	Determination of speed ratio in Epicyclic gear box		
	28	Necessity, construction and working of over running clutch		
8 TH	29	Torque converter – construction, principle of working	8	Servicing of universal joints, slip joint
	30	Continuously variable transmission (CVT)		
	31	Automated Manual Transmission (AMT)		
	32	Common faults and their remedies		
9 TH	33	UNIT 4: FINAL DRIVE Propeller shaft – function, construction details	9	Servicing and overhauling of synchromesh gear box
	34	Universal joints - functions and types		
	35	Final drive: Hotchkiss drive		
	36	Final drive: Torque tube drive		
10 TH	37	Differential – principle, functions and its working	10	Servicing of propeller shaft
	38	Rear axles – semi floating, three quarter floating, fully floating		
	39	Common faults and their remedies		
	40	Sessional Test-2		
11 TH	41	UNIT 5: FRONT AXLE Types – Stub double drop, fully dropped	11	Servicing of differential, adjustment of crown and pinion backlash
	42	Load distribution in front axle		
	43	Effect of braking on axle shape, steering head		
	44	Elliot and reverse Elliot stub axle		
12 TH	45	Steering knuckle	12	Study of wheel alignment machine
	46	UNIT 6: STEERING Function, Steering mechanism		
	47	Davis and Ackerman's Principle of steering		
	48	Working and constructional details of steering gear boxes - I		
13 TH	49	Working and constructional details of steering gear boxes - II	13	Checking and adjustment of steering geometry, camber, caster, Toe-in, Toe-out, kingpin inclination.
	50	Steering linkages, sector arm, center arm, drag link and tie rod steering stops		
	51	Front wheel geometry-caster, camber, steering axis inclination, toe in and toe out		
	52	Cornering force, cornering power and self-righting torque		
14 TH	53	Over steering and under steering	14	Study of live axles
	54	Power steering – necessity, types		
	55	Construction features and working of hydraulic power steering – Integral type		

	56	Construction features and working of hydraulic power steering – Semi-integral type		
15TH	57	Construction features and working of electronic power steering system	15	Final viva voce and evaluation
	58	Common steering systems troubles and remedies		
	59	Brief revision of the subject		
	60	Sessional Test-3		

LESSON PLAN

Name of Faculty: HARIPAL DHARIWAL

Discipline: Automobile Engineering

Semester: 4th

Subject: CAD Lab

Lesson plan Duration: 15 WEEKS

Work Load (Lecture/Practical) per week: 3 PERIODS

WEEK	PRACTICAL	
	PRACTICAL DAY	TOPIC
1ST	1	Introduction to AutoCAD : Starting up, practice on – how to create a new drawing file, setting drawing limits & saving a file
2ND	2	Drawing lines in different ways using absolute co-ordinates, user co-ordinates, WCS, UCS, drawing circles, drawing arcs, drawing ellipses. Drawing polygons, drawings splines, Drawing polylines, using window, zoom commands
3RD	3	Practice on Edit commands such as erase, copy, mirror, array, offset, rotate, oops, undo, redo, scale, stretch command
4TH	4	Practice on Text commands: editing text, text size, text styles, change properties commands
5TH	5	Practice on trim, break, extend, chamfer, fillet, O snap command; Draw orthographic views of simple objects
6TH	6	Practice on Layer Commands: creating layer, freeze, layer on/off, lock & unlock layer, move from one layer to other.
7TH	7	Practice on Layer Commands: colour assigning, current layer, load line type; Practice on hatching,
8TH	8	Practice on Dimensioning, linear dimensioning, angular dimensioning radius/diameter dimensioning, snap command, aligned dimensioning; applying tolerance; Editing of dimensioning

9TH	9	Practice on print commands. Export commands Practice on plot commands. Import commands
10TH	10	Practice on making complete drawings of Stepped pulley and V-belt pulley using AUTOCAD (2D)
11TH	11	Practice on making complete drawings of Flanged coupling using AUTOCAD (2D)
12TH	12	Practice on 3D drawing: drawing cube, sphere, cylinder, cone; 3D modeling: Transformation, translation, scaling, rotation etc. Isometric drawing
13TH	13	Practice on making complete drawings of Screw jack using AUTOCAD (2D)
14TH	14	Introduction to CAD software like CATIA/ProE
15TH	15	Final viva and evaluation