LESSON PLAN

Name of Faculty : **RISHI RAJ**

Discipline : **ME**

Semester : **6th**

Subject : **Measurement & Instrumentation**

Lesson Plan Duration : 15 weeks (From Jan 2018 to Apr 2018)

**Workload (lecture/ practical) per week (in hours): lectures (3), Practical's (2).

Weeks	Theory		Practical's	
	Lecture day	Topic (including assignment/test)	Practical day	Topic
1st	1st	Instruments and Their Representation : Introduction	1st	To Study various Temperature Measuring Instruments and to Estimate their Response times. (a) Mercury – in glass thermometer (b) Thermocouple (c) Electrical resistance thermometer (d) Bio-metallic strip
	2nd	Typical Applications of Instrument Systems, Functional Elements of a Measurement System	2nd	
	3rd	Classification of Instruments, Standards and Calibration	3rd	
2nd	1st	Static and Dynamic characteristics of Instruments : Introduction,	1st	To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up.
	2nd	Accuracy, Precision, Resolution, Threshold, Sensitivity,	2nd	
	3rd	Linearity, Hysteresis, Dead Band, Backlash, Drift,	3rd	
3rd	1st	Formulation of Differential Equations for Dynamic Performance- Zero Order,	1st	To study a Linear Variable Differential Transformer (LVDT) and use it in a simple experimental set up to measure a small displacement.
	2nd	First Order and Second order systems	2nd	
	3rd	Response of First and Second Order Systems to Step, Ramp,	3rd	
4th	1st	Impulse and Harmonic Functions.	1st	

	2nd	Transducer Elements : Introduction, Analog and Digital Transducers,	2nd	
	3rd	Electromechanical; Potentiometric, Inductive Self Generating and Non-Self Generating Types, Electromagnetic, Electrodynamic, Eddy Current,Magnetostrictive,	3rd	To study the characteristics of a pneumatic displacement gauge.
5th	1st	Variable Inductance, Linearly Variable Differential Transformer, Variable Capacitance,	1st	To measure load (tensile/compressive) using load cell on a tutor.
	2nd	PiezoElectric Transducer and Associated Circuits, Unbonded and Bonded Resistance Strain Gages	2nd	
	3rd	Strain Gage Bridge circuits, Single Double and Four Active Arm Bridge Arrangements,	3rd	
6th	1st	Temperature Compensation, Balancing and Calibration,	1st	To measure torque of a rotating shaft using torsion meter/ strain gauge torque transducer.
	2nd	Ionisation Transducers, Mechano Electronic Transducers, Opto-Electrical Transducers,	2nd	
	3rd	Photo Conductive Transducers, Photo Volatic Transducers,	3rd	
7th	1st	Digital Transducers, Frequency Domain Transducer,	1st	To measure the speed of a motor shaft with the help of non-contact type pick-ups (magnetic or photoelectric).
	2nd	Vibrating String Transducer, Binary codes, Digital Encoders.	2nd	
	3rd	Motion, Force and Torque Measurement : Introduction	3rd	
8th	1st	Relative motion Measuring Devices, Electromechanical, Optical	1st	To measure the stress & strain using strain gauges mounted on simply supported beam/cantilever beam
	2nd	Photo Electric, Moire-Fringe, Pneumatic, Absolute Motion Devices, Seismic Devices	2nd	

	3rd	Spring Mass & Force Balance Type, Calibration, Hydraulic Load Cell, Pneumatic Load Cell,	3rd	
9th	1st	Elastic Force Devices, Separation of Force Components, Electro Mechanical Methods,	1st	To measure static/dynamic pressure of fluid in pipe/tube using pressure transducer/pressure cell.
	2nd	Strain Gage, Torque Transducer, Toque Meter, Intermediate,	2nd	
	3rd	Indicating and Recording Elements : Introduction Amplifiers,	3rd	
10th	1st	Mechanical, Hydraulic, Pneumatic,	1st	To test experimental data for Normal Distribution using Chi Square test.
	2nd	Optical, Electrical Amplifying elements,	2nd	
	3rd	Compensators, Differentiating and Integrating Elements,	3rd	
11th	1st	Pressure and Flow Measurement : Pressure & Flow Measurement	1st	Practical revision and Problems
	2nd	Introduction : Moderate Pressure Measurement, Monometers	2nd	
	3rd	Elastic Transducer, Dynamic Effects of Connecting Tubing, High Pressure Transducer	3rd	
12th	1st	Low Pressure Measurement, Calibration and Testing, Quantity Meters,	1st	Practical revision and Problems
	2nd	Positive Displacement Meters, Flow Rate Meters, Variable Head Meters, Variable Area Meters	2nd	
	3rd	Rotameters, Pitot-Static Tube Meter,Drag Force Flow Meter,	3rd	
13th	1st	Turbine Flow Meter, Electronic Flow Meter, Electro Magnetic Flow meter. Hot-Wire Anemometer.	1st	Practical revision and Problems
	2nd	Temperature Measurement : Introduction, Measurement of Temperature,	2nd	

	3rd	Non Electrical Methods – Solid Rod Thermometer, Bimetallic Thermometer,	3rd	
14th	1st	Liquid-in-Glass thermometer, Pressure Thermometer	1st	Practical revision and Problems
	2nd	Electrical Methods – Electrical Resistance Thermometers,	2nd	
	3rd	Semiconductor Resistance Sensors (Thermistors),	3rd	
15th	1st	Thermo–Electric Sensors, Thermocouple Materials,	1st	Internal Viva Voce
	2nd	Radiation Methods (Pyrometry), Total Radiation Pyrometer,	2nd	
	3rd	Selective Radiation Pyrometer.	3rd	

LESSON PLAN

Name of Faculty : **RISHI RAJ**

Discipline : **ME**

Semester : **6th**

Subject : **Automatic Controls**

Lesson Plan Duration : 15 weeks (From Jan 2018 to Apr 2018)

**Workload (lecture/ practical) per week (in hours): lectures (3), Practical's (0)

	Theory	
Week	Lecture day	Topic (including assignment/test)
1st	1st	Introduction And Applications: Types of control systems
	2nd	Typical Block Diagram : Performance Analysis; Applications
	3rd	Machine Tool Control, Boiler Control, Engine Governing
2nd	1st	Aerospace Control, Active Vibration Control
	2nd	Representation of Processes & Control Elements – Mathematical Modeling. Block Diagram Representation
	3rd	Numerical /Assignment
3rd	1st	Representation of Systems or Processes, Comparison Elements
	2nd	Representation of Feedback Control systems – Block Diagram & Transfer Function Representation
	3rd	Representation of a Temperature, Control System, Signal Flow Graphs,
4th	1st	Problems, Numerical/Assignment
	2nd	Types of Controllers : Introduction : Types of Control Action
	3rd	Hydraulic Controllers; Electronic Controllers; Pneumatic Controllers;
5th	1st	Problems, Numerical/Assignment
	2nd	Transient And Steady State Response: Time Domain Representation

	3rd	Laplace Transform Representation; System with Proportional Control
6th	1st	Class Test
	2nd	Proportional – cum – Derivative control; Proportional – cum – Integral Control
	3rd	Error Constants; Problems.
7th	1st	Frequency Response Analysis: Introduction
	2nd	Closed and Open Loop Transfer Function; Polar Plots.
	3rd	Rectangular Plots; Nichols Plots: Equivalent Unity Feed Back Systems;
8th	1st	1st Sessional Exam
	2nd	1st Sessional Exam
	3rd	1st Sessional Exam
9th	1st	Stability Of Control Systems : Introduction
	2nd	Characteristic Equation; Routh's Criterion; Nyquists
	3rd	Criterion, Gain & Phase Margins: Problems.
10th	1st	Root Locus Method : Introduction; Root Ioci of a Second Order System
	2nd	General Case; Rules for Drawing Forms of Root Ioci
	3rd	Numerical/Assignment
11th	1st	Relation between Root Locus Locations and Transient Response; Parametric Variation.
	2nd	Problems
	3rd	Digital Control System : Introduction
12th	1st	Representation of Sampled Signal; Hold Device
	2nd	Class Test
	3rd	Pulse Transfer Function; Block Diagrams; Transient Response
13th	1st	Routh's Stability Criterion; Root Locus Method; Nyquists Criterion

	2nd	Problems.
	3rd	State Space Analysis Of Control Systems: Introduction;
14th	1st	Class Test
	2nd	Generalized State Equation; Techniques for Deriving System State
	3rd	Space Equations; Transfer Function from State Equations
15th	1st	Solution of State Vector Differential Equations
	2nd	Discrete Systems; Problems.
	3rd	Class Test

Name of Faculty: Mr. Chirag				
Discipline:	Mechanical Engineering			
Semester:	6th			
Subject:	Industrial Engineering			
Lesson Plan Duration:15 weeks (from 29January, 2018 to 30April, 2018)				
Work Load (Lecture/Practical) per week in hours: Lecture 03, Practical 00				
Week	**Theory**		**Practical**	
	Lecture Day	**Topic (including assignment/test)**	**Practical Day**	**Topic**
1st	1st	Definition of Industrial Engineering: Objectives, Method study, Principle of motion economy	Not in Syllabus	Not in Syllabus
	2nd	Techniques of method study - Various charts, THERBLIGS		
	3rd	Work measurement - various methods, time study PMTS		
2nd	4th	determining time, Work sampling		
	5th	Numericals		
	6th	Productivity & Workforce Management :Productivity - Definition, Various methods of measurement		
3rd	7th	Factors effecting productivity, Strategies for improving productivity		
	8th	Various methods of Job evaluation & merit rating		
	9th	Various incentive payment schemes, Behavioural aspects, Financial incentives		
4th	10th	Manufacturing Cost Analysis: Fixed & variable costs, Direct, indirect & overhead costs		
	11th	costing, Recovery of overheads,		
	12th	Standard costing, Cost control, Cost variance Analysis - Labour, material		
5th	13th	overhead in volume, rate & efficiency, Break even Analysis		
	14th	Marginal costing & contribution		
	15th	Numericals		

6th	16th	Class Test		
	17th	Materials Management : Strategic importance of materials in manufacturing industries		
	18th	Relevant costs, Inventory control models - Economic order quantity (EOQ)		
7th	19th	Economic batch quantity (EBQ) with & without shortage		
	20th	Purchase discounts, Sensitivity analysis, Inventory control systems - P,Q,Ss Systems		
	21st	Service level, Stock out risk		
8th	22nd	determination of order point & safety stock, Selective inventory control		
	23rd	ABC, FSN, SDE, VED and three dimensional		
	24th	Numericals		
9th	25th	Quality Management: Definition of quality, Various approaches, Concept of quality assurance systems		
	26th	Costs of quality, Statistical quality Control (SQC), Variables & Attributes, X, R, P & C - charts, Acceptance sampling		
	27th	OC - curve, Concept of AOQL, Sampling plan - Single, Double & sequential		
10th	28th	Introduction to TQM & ISO - 9000.		
	29th	Production Planning & Control (PPC) : Introduction to Forecasting - Simple & Weighted moving average methods		
	30th	Objectives & variables of PPC, Aggregate planning - Basic Concept, its relations with other decision areas		
11th	31st	Class Test		
	32nd	Decision options - Basic & mixed strategies, Master production schedule (MPS),		
	33rd	Scheduling Operations Various methods for line & intermittent production systems, Gantt chart, Sequencing - Johnson algorithm for n-Jobs-2 machines		

12th	34th	n- Jobs-3 machines, 2 Jobs n-machines		
	35th	n-Jobs m-machines Various		
	36th	means of measuring effectiveness of PPC, Introduction to JIT, Numericals		
13th	37th	Management Information Systems (MIS) : What is MIS ? Importance of MIS		
	38th	Organizational & information system structure, Role of MIS in decision making		
	39th	Data flow diagram, Introduction to systems analysis & design		
14th	40th	Organizing information systems		
	41st	Product Design and Development: Various Approaches, Product life cycle		
	42nd	Role 3S's – Standardization		
15th	43rd	Simplification, Specialization, Introduction to value engineering and analysis		
	44th	Role of Ergonomics in Product Design		
	45th	Class Test		

LESSON PLAN

Name of Faculty : **Umesh Gupta**

Discipline : **ME**

Semester : **6th**

Subject : **AUTOMOBILE ENGINEERING (ME-302-F)**

Lesson Plan Duration : 15 weeks (From Jan 2018 to Apr 2018)

**Workload (lecture/ practical) per week (in hours): lectures (3), Practical's (2).

Weeks	Theory		Practical's	
	Lecture day	Topic (including assignment/test)	Practical day	Topic
1st	1st	Introduction to Automobiles : Classification, Components, Requirements of Automobile Body; Vehicle Frame	1st	Introduction of lab equipments and discussion about safety measures
	2nd	Separate Body & Frame, Unitized Body, Car Body Styles, Bus Body & Commercial Vehicle Body Types; Front Engine Rear Drive & Front Engine Front Drive Vehicles	2nd	
	3rd	Four Wheel Drive Vehicles, Safety considerations; Safety features of latest vehicle; Future trends in automobiles	3rd	
2nd	1st	Clutches : Requirement of Clutches – Principle of Friction Clutch – Wet Type & Dry Types; Cone	1st	To study and prepare report on the constructional details, working principles and operation of the following-
	2nd	Clutch, Single Plate Clutch, Diaphragm Spring Clutch, Multi plate Clutch, Centrifugal Clutches	2nd	Automotive Engine Systems & Sub Systems.
	3rd	Numerical Electromagnetic Clutch, Over Running Clutch; Clutch Linkages	3rd	
3rd	1st	Power Transmission : Requirements of transmission system; General	1st	

		Arrangement of Power Transmission system		To study and prepare report on the constructional details, working principles and operation of the following Fuels supply systems:
	2nd	Object of the Gear Box; Different types of Gear Boxes; Sliding Mesh, Constant Mesh, Synchro- mesh Gear Boxes	2nd	
	3rd	Epi-cyclic Gear Box, Freewheel Unit. Overdrive unit-Principle of Overdrive, Advantage of Overdrive, Transaxle, Transfer cases	3rd	
4th	1st	Revision-1	1st	To study and prepare report on the constructional details, working principles and operation of the following Automotive Clutches.
	2nd	Assignment-1,2,3	2nd	
	3rd	Drive Lines, Universal Joint, Differential and Drive Axles: Effect of driving thrust and torque reactions	3rd	
5th	1st	Hotchkiss Drive, Torque Tube Drive and radius Rods; Propeller Shaft	1st	To study and prepare report on the constructional details, working principles and operation of the following Automotive Transmission systems.
	2nd	Universal Joints, Slip Joint; Constant Velocity Universal Joints; Front Wheel Drive; Principle, Function, Construction & Operation of Differential; Rear Axles	2nd	
	3rd	Types of load coming on Rear Axles, Full Floating, Three quarter Floating and Semi Floating Rear Axles	3rd	
6th	1st	Suspension Systems : Need of Suspension System, Types of Suspension	1st	To study and prepare report on the constructional details, working principles and operation of the following Automotive Drive Lines & Differentials.
	2nd	factors influencing ride comfort, Suspension Spring; Constructional details and characteristics of leaf springs	2nd	
	3rd	Numerical/Assignment	3rd	
7th	1st	Steering System : Front Wheel geometry & Wheel alignment viz. Caster	1st	To study and prepare report on the constructional details, working principles and operation of the following

	2nd	Camber, King pin Inclination, Toe-in/Toe-out; Conditions for true rolling motions of Wheels during steering	2nd	Automotive Suspension Systems
	3rd	Different types of Steering Gear Boxes; Steering linkages and layout	3rd	
8th	1st	1st Sessional Exam	1st	To study and prepare report on the constructional details, working principles and operation of the following Automotive Steering Systems.
	2nd	1st Sessional Exam	2nd	
	3rd	1st Sessional Exam	3rd	
9th	1st	Power steering – Rack & Pinion Power Steering Gear, Electronics steering	1st	To study and prepare report on the constructional details, working principles and operation of the following Automotive Tyres & wheels.
	2nd	Automotive Brakes, Tyres & Wheels	2nd	
	3rd	Classification of Brakes; Principle and constructional details of Drum Brakes, Disc Brakes	3rd	
10th	1st	Brake actuating systems; Mechanical, Hydraulic brake	1st	To study and prepare report on the constructional details, working principles and operation of the Automotive Brake systems.
	2nd	Pneumatic Brakes; Factors affecting Brake performance, Power & Power Assisted Brakes	2nd	
	3rd	Assignment	3rd	
11th	1st	Tyres of Wheels; Types of Tyre & their constructional details	1st	To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.
	2nd	Wheel Balancing, Tyre Rotation; Types of Tyre wear & their causes	2nd	
	3rd	CLASS TEST	3rd	
12th	1st	Revsion	1st	Practical revision and Problems
	2nd	Emission Control System & Automotive Electrical	2nd	
	3rd	Sources of Atmospheric Pollution from the automobile	3rd	
13th	1st	Emission Control Systems – Construction and Operation of Positive Crank Case Ventilation (PVC) Systems	1st	Practical revision and Problems

	2nd	Evaporative Emission Control, Heated Air Intake System, Exhaust Gas Recirculation (ECR) Systems	2nd	
	3rd	Air Injection System and Catalytic Converters	3rd	
14th	1st	construction & operation of lead acid Battery, Capacity Rating & Maintenance of Batteries	1st	Practical revision and Problems
	2nd	CLASS TEST	2nd	
	3rd	Purpose and Operation of Charging Systems	3rd	
15th	1st	Purpose and Operations of the Starting System	1st	Internal Viva Voce
	2nd	Vehicle Lighting System	2nd	
	3rd	Revision	3rd	

LESSON PLAN

Name of Faculty : Vishal Gupta

Discipline : **ME**

Semester : 6th

Subject : HT

Lesson Plan Duration : 15 weeks (From Jan 2018 to Apr 2018)

**Workload (lecture/ practical) per week (in hours): lectures (3), Practical's (2).

Weeks	Theory		Practical's	
	Lecture day	Topic (including assignment/test)	Practical day	Topic
1st	1st	Basics and Laws : Definition of Heat Transfer, Reversible and irreversible processes	1st	To determine the thermal conductivity of a metallic rod.
	2nd	Modes of heat flow	2nd	
	3rd	Combined heat transfer system and law of energy conservation	3rd	
2nd	1st	Numericals	1st	To determine the thermal conductivity of an insulating power.
	2nd	Steady State Heat Conduction : Introduction, I-D heat conduction through a plane wall	2nd	
	3rd	long hollow cylinder, hollow sphere	3rd	
3rd	1st	Conduction equation in Cartesian, polar and spherical co-ordinate systems, Numericals	1st	To determine the thermal conductivity of a solid by the guarded hot plate method.
	2nd	Numericals	2nd	
	3rd	Steady State Conduction with Heat Generation	3rd	
4th	1st	Introduction, 1 – D heat conduction with heat sources	1st	To find the effectiveness of a pin fin in a rectangular duct natural convective condition

	2nd	Extended surfaces (fins), Fin effectiveness	2nd	and plot temperature distribution along its length.
	3rd	2-D heat conduction , Numericals	3rd	
5th	1st	Numericals	1st	To find the effectiveness of a pin fin in a rectangular duct under forced convective and plot temperature distribution along its length.
	2nd	Transient Heat Conduction : Systems with negligible internal resistance	2nd	
	3rd	cylinders, spheres with convective boundary conditions	3rd	
6th	1st	Transient heat conduction in plane walls Chart solution	1st	To determine the surface heat transfer coefficient for a heated vertical tube under natural convection and plot the variation of local heat transfer coefficient along the length of the tube. Also compare the results with those of the correlation.
	2nd	Relaxation Method	2nd	
	3rd	Numericals	3rd	
7th	1st	Numerical Problems	1st	To determine average heat transfer co-efficient for a externally heated horizontal pipe under forced convection & plot Reynolds and Nusselt numbers along the length of pipe. Also compare the results with those of the correlations.
	2nd	Numerical problems	2nd	
	3rd	Surprise class test	3rd	
8th	1st	1st Sessional Exam	1st	
	2nd	1st Sessional Exam	2nd	
	3rd	1st Sessional Exam	3rd	
9th	1st	Convection : Forced convection-Thermal and hydrodynamic boundary layers	1st	To measure the emmisivity of the gray body (plate) at different temperature and plot the variation of emmisivity with surface temperature.
	2nd	Equation of continuity, Momentum and energy equations	2nd	
	3rd	Some results for flow over a flat plate and flow through tube, Fluid friction and heat transfer (Colburn analogy)	3rd	
10th	1st	Free convection from a vertical flat plate, Empirical relations for free	1st	To find overall heat transfer coefficient and effectiveness of a heat exchange under

		convection from vertical and horizontal o\planes & cylinders, Numericals		parallel and counter flow conditions. Also plot the temperature distribution in both the cases along the length of heat of heat exchanger.
	2nd	Numericals	2nd	
	3rd	Assignment	3rd	
11th	1st	Thermal Radiation: The Stephen-Boltzmann law, The black body radiation	1st	To verify the Stefen-Boltzmann constant for thermal radiation.To determine the coefficient of impact for vanes.
	2nd	Shape factors and their relationships, Heat exchange between non black bodies	2nd	
	3rd	Electrical network for radiative exchange in an enclosure of two or three gray bodies	3rd	
12th	1st	Radiation shields, Numericals	1st	Practical revision and Problems
	2nd	Heat Exchangers: Classification, Performance variables	2nd	
	3rd	Analysis of a parallel/counter flow heat exchanger	3rd	
13th	1st	Heat exchanger effectiveness, Numericals	1st	Practical revision and Problems
	2nd	Numericals	2nd	
	3rd	Heat Transfer with Change of Phase	3rd	
14th	1st	Laminar film condensation on a vertical plate, Drop-wise condensation	1st	Practical revision and Problems
	2nd	Boiling regimes, Free convective, Nucleate and film boiling	2nd	
	3rd	Numerical Problems	3rd	
15th	1st	Problems	1st	Internal Viva Voce
	2nd	Problems	2nd	
	3rd	CLASS TEST	3rd	

LESSON PLAN

Name of Faculty : SATISH KUMAR

Discipline : **ME**

Semester : **6th**

Subject : **Mechanical machine design-2**

Lesson Plan Duration : 15 weeks (From Jan 2018 to Apr 2018)

**Workload (lecture/ practical) per week (in hours): lectures (3).

Weeks	Theory			
	Lecture day	Topic (including assignment/test)		
1st	1st	Ergonomic concept		
	2nd	Value engg consideration in design		
	3rd	Design consideration for casting		
2nd	1st	Design consideration for forging		
	2nd	Design consideration for machining		
	3rd	Stress concentration factor and variable stress		
	2nd	Fatigue design consideration		
	3rd	Numerical		
4th	1st	Goodman criteria, numerical		
	2nd	Soderbergs criteria, Numerical		
	3rd	CLASS TEST		
5th	1st	Torsion Of Circular shaft		

	2nd	Design of shaft consideration		
	3rd	Design of shaft consideration in static loading		
6th	1st	Numerical		
	2nd	Design of shaft consideration in dynamic loading		
	3rd	Numerical/Assignment		
7th	1st	Torsion Of Hollow Circular Member		
	2nd	Hollow circular shafts, tapered shaft, stepped shaft & composite circular shafts		
	3rd	combined bending and torsion, equivalent torque, effect of end thrust. Numericals		
8th	1st	1st Sessional Exam		
	2nd	1st Sessional Exam		
	3rd	1st Sessional Exam		
9th	1st	Springs : Types of Springs		
	2nd	Design for helical springs against tension and their uses,		
	3rd	Design of leaf springs		
10th	1st	Surging phenomenon in springs		
	2nd	Numericals		
	3rd	Assignment		
11th	1st	Bearings : design of pivot and collar bearing , Selection of ball and roller bearing based on static and dynamic load carrying capacity using load-life relationship		

	2nd	types of lubrication		
	3rd	Numericals		
12th	1st	Design of journal bearings		
	2nd	Lubricants and their properties, Selection of suitable lubricants,		
	3rd	Numerical/Assignments		
13th	1st	Gears : Classification, Selection of gears, Terminology of gears		
	2nd	Force analysis, Selection of material for gears,		
	3rd	Beam & wear strength of gear tooth, Form or Lewis factor for gear tooth,		
14th	1st	Dynamic load on gear teeth		
	2nd	Numerical/Assignment		
	3rd	Design problem		
15th	1st	Design of spur, helical, bevel & worm gear		
	2nd	Numerical/Assignment		
	3rd	CLASS TEST		