GATEWAY INSTITUTE OF ENGINEERING AND TECHNOLOGY, SONIPAT

LESSON PLAN

Name of the Faculty : Mr. Narender Kumar
Discipline : Mechanical Engineering
Semester : 4th
Subject : Strength of Materials-2 (ME 206B)
Lesson Plan Duration : 15 Weeks (January 2018 to April 2018)
Work Load (Lectures) per week in hours: Lectures – 03, Tutorial – 01

Week	Theory	
	Lecture Day	Topic (including assignment/ test)
1st	1	Hoop & Longitudinal stresses in cylindrical vessel & their derivations under internal
	2	Hoop & Longitudinal stresses in spherical vessel & their derivations under internal
	3	Hoop & Longitudinal strains in cylindrical & spherical vessels
2nd	4	Volumetric strains
	5	Concept and difference of thin and thick vessels
	6	Derivation of Lame's equations
3rd	7	Radial & hoop stresses in thick and compound cylinders
	8	Radial & hoop strains in thick and compound cylinders
	9	Radial & hoop stresses in spherical shells subjected to internal fluid pressure only
4th	10	Radial & hoop strains in spherical shells subjected to internal fluid pressure only
	11	Definitions and basic concepts of strain energy
	12	Expressions for strain energy stored in a body when load is gradually
5th	13	Suddenly and with impact
	14	Strain energy of beams due to bending
	15	Strain energy of beams due to pure shear
6th	16	Horizontal shear and torsion
	17	Strain energy of beams due to beam deflections
	18	Castigliano's theorems
7th	19	Maxweel theorems
	20	Various theories of elastic failures with derivations and graphical representations
	21	Applications to problems of 2-dimensional stress system with combined direct loading
8th	22	Combined torsional and direct loading
	23	Stresses in Rotating Ring and Disc
	24	Hollow disc and solids disc
9th	25	Stresses in rotating cylinders
	26	Hollow cylinders & solids cylinder
	27	Rotating discs of uniform strength
10th	28	Stresses in open coiled helical spring subjected to axial loads
	29	Stresses in open coiled helical spring subjected to axial couples
	30	Combined action of axial loads and axial couples
11th	31	Leaf springs
	32	Flat spiral springs
	33	Energy methods in determining spring deflection
12th	34	Properties of beam cross section
	35	Product of inertia

	36	Ellipse of inertia
13th	**37**	Slope of the neutral axis
	38	Stresses & deflections
	39	Shear center and the flexural axis for I-section and channel section
14th	**40**	Stresses in beam of initial large radius of curvature
	41	Position of neutral axis for rectangular
	42	Circular and trapezoidal sections
15th	**43**	Stresses in crane hooks
	44	Stresses in circular rings subjected to tension or compression
	45	Revision (Previous year papers)

Name of the Faculty : Mr. Jeetendra Kumar
Discipline : Mechanical Engineering
Semester : 4th
Subject : MANUFACTURING TECHNOLOGY (ME202B)
Lesson Plan Duration : 15 Weeks (January 2018 to April 2018)
Work Load (Lectures) per week in hours: Lectures – 03, Tutorial – 01

Week	**Theory**	
	Lecture Day	**Topic (including assignment/ test)**
1st	**1**	Steps involved in casting, advantages, limitations and applications of casting process,
	2	molding methods, molding materials and properties
	3	Design considerations in casting, gating system design
2nd	**4**	Riser design, directional solidification in castings,problems
	5	Melting practice: Cupola, charge calculations,
	6	cleaning of casting, Fettling,
3rd	**7**	defects in castings and their remedies,
	8	Shell molding, precision investment casting,
	9	permanent mold casting, die casting
4th	**10**	centrifugal casting, and continuous casting
	11	Classification of metal forming processes, Nature of plastic deformation
	12	Hot working and cold working,
5th	**13**	yield criteria and their significance,
	14	Principles of rolling roll passes roll pass sequences.
	15	Forging: process and defects,
6th	**16**	Extrusion and other processes
	17	Extrusion principle, wire drawing, swaging, tube making.
	18	POWDER METALLURGY - Introduction
7th	**19**	Production of Metallic Powder,
	20	Processing methods
	21	Design consideration for powder metallurgy
8th	**22**	INTRODUCTION TO WELDING -Classification of welding process, Selection of a welding process,

8th	**23**	Effect of welding parameters,
	24	Selection of electrodes and fluxes, Metal transfer & its importance in arc welding,
9th	**25**	Power sources for arc welding, Inspections and defects of weldments,
	26	Gas welding,
	27	Arc welding, Resistance welding
10th	**28**	OTHER WELDING PROCESSES: Introduction of thermit welding,
	29	electro slag welding,
	30	Electron beam welding, forge welding,
11th	**31**	friction welding,
	32	Diffusion welding,
	33	brazing and soldering
12th	**34**	Classification of sheet metal processes
	35	Press tool operations, shearing action, Principle,
	36	Process parameters,equipment and application of the following processes, a dashpot,
13th	**37**	power absorbed in bearings
	38	piercing, blanking, deep drawing,
	39	Spinning, stretch forming,
14th	**40**	embossing and coining,
	41	Sheet metal die design, problems.
	42	PLASTIC PROCESSING- Introduction, plastic materials,
15th	**43**	Extrusion of plastic,
	44	injection moulding,.
	45	Blow moulding

Name of the Faculty : Mr. Lalit Kumar
Discipline:- B. Tech. (ME)
Semester : 4th
Subject : Material Science (ME 204 B)
Lession Plan Duration: 15 Weeks (from January,2018 to April,2018
Work Load (Lectures) per week in hours: Lectures – 03, Tutorial – 01, Practical- 02

Week	**Theory**		
	Lecture Da	**Topic (including assignment/test)**	**Practical D**
1st	1st	**Engineering Materials:** Classification of engineering materials,	1st
	2nd	Property spectrum of engineering materials Crystal Geometry:	
	3rd	space lattice,unit cell, Bravais crystal system, atomic packing fraction,	
2nd	4th	Miller indices, interplaner spacing	2nd
	5th	linear density, planer density, Numerical problems	
	6th	**Crystal Imperfcections**: Classification of Imperfections, ,	
3rd	7th	line imperfection	3rd
	8th	Mixed dislocations, Characteristics of dislocation ,	
	9th	Sources of dislocation, their effects and remedies, phenomenon related to behaviour of dislocations,	
4th	10th	phenomenon related to behaviour of dislocations	4th
	11th	Surface imperfection, volume imperfection, whiskers	
	12th	Solid solution, types of solid solution, phases	

5th	13th	Gibb's Phase rule, Phase diagrams, unary and binary phase diagrams,	5th
	14th	Eutectic and eutectoid phase diagrams, peritectic and peritectoid phase diagrams	
	15th	Microstructural changes, lever rule, Iron carbon system	
6th	16th	**PHASE TRANSFORMATIONS:** terminology, Strengthening mechanism,	6th
	17th	Cold and hot working, precipitation hardening,	
	18th	Dispersion hardening, solid solution hardening, Recovery, re-crystallization and grain growth.	
7th	19th	re-crystallization and grain growth.	7th
	20th	Diffusion process, types of diffusion, laws of diffusion- Fick's first law and Fick's second law of diffusion	
	21st	**HEAT TREATMENT:** purpose of heat treatment, microstructure of steel and iron,	
8th	22nd	Transformation in Steel and Critical cooling curve, Hardening,	8th
	23rd	annealing, normalizing	
	24th	Stress relieving, tempering, carburizing, nitriding,	
9th	25th	Cyaniding, flame and induction hardening.	9th
	26th	Inelastic deformation, slip systems, critical resolved shear stress (crss) yielding	
	27th	Strain hardening, bauschinger effect, frank read source,	
10th	28th	Anelastic behaviour, Viscoelastic behaviour	
	29th	**FRACTURE**: Ductile fracture, brittle fracture,	
	30th	Griffith theory of crack propagation, cleavage fracture,	
11th	31st	method of protection against fracture ,Ductile to brittle transition	
	32nd	**CORROSION AND OXIDATION:** Corrosion,,	
	33rd	types of corrosion	
12th	34th	laws of corrosion ,oxidation and its mechanism, passivity	
	35th	Special type of corrosion, protection against corrosion and oxidation.	
	36th	Fatigue, mechanism of fatigue, improving fatigue life, Creep, factor affecting creep	
13th	37th	mechanism of creep, creep resistant materials	
	38th	Plain carbon steel, cast iron, effects of alloying elements on steel,	
	39th	effects on alloying elements on non-ferrous metals,	
14th	40th	ferrous alloys,	
	41st	non ferrous alloys, alloys in different applications, materials for special cases.	
	42nd	Composite materials: introduction, laminates, reinforced	
15th	43rd	composite materials and their classification	
	44th	particulate composites, flake composites,	
	45th	whisker reinforced composites, hybrid composites,	

Name of Faculty: Ms Surbhi gupta
Discipline:- ME,and CE
Semester: 4th
Subjects: Engineering Economics (MGT-201B)
Lession Plan Duration: 15 Weeks (from January,2018 to April,2018
Workload(Lecture/Practical) per week (in hours) : Lecture-03

Week	**Theory**	
	Lecture D	**Topic (including assignment/test)**
1st	1st	Definition of economics
	2nd	Nature of economic problem, micro and macro economics- their feature and scope
	3rd	Production possibility curve,

2nd	4th	Economic laws and their nature.
	5th	Utility & its features
	6th	Law of diminishing marginal utility
3rd	7th	**Test**
	8th	Law of equi-marginal utility
	9th	Its practical application and importance.
4th	10th	Meaning of demand, individual and market demand schedule,
	11th	Law of demand
	12th	shape of demand curves
5th	13th	**Test**
	14th	Elasticity of demand and degrees of price elasticity of demand.
	15th	Measurement of Elasticity of demand.
6th	16th	Factors effecting elasticity of demand
	17th	Practical importance & application of the concept of elasticity of demand.
	18th	**Test**
7th	19th	Concepts of cost-fixed cost, variable cost
	20th	fixed cost, variable cost ,Average cost, marginal cost.
	21st	money cost, real cost, opportunity cost.
8th	22nd	Shape of average cost,Marginal cost, total cost etc. In short run and long run
	23rd	Meaning of production and factors of production
	24th	law of variable proportions
9th	25th	law of return to scale
	26th	Internet and external economics andDiseconomies of scale
	27th	**Test**
10th	28th	Meaning of market
	29th	Features of market
	30th	Type of markets – perfect competition mainFeatures of these markets)
11th	31st	Monopoly(mainFeatures of these markets)
	32nd	oligopoly(mainFeatures of these markets)
	33rd	monopolistic competition (mainFeatures of these markets)
12th	34th	**Test**
	35th	Supply and law of supply
	36th	Role of demand & supply in price determination
13th	37th	Effect of changes in demand and supply on prices
	38th	Nature And characteristics of Indian economy,
	39th	**Test**
14th	40th	Privatization – meaning, merits and demerits.
	41st	Globalization of India economy – merits and demerits
	42nd	Elementary concept of WTO & Trips agreement
15th	43rd	Monitory policy
	44th	Fiscal policy
	45th	**Test**

Name of Faculty: Mr. Nikhil Rohilla

Discipline:- B. Tech. (ME)
Semester: 4th
Subjects: Fluid Machines (ME 208B), Fluid Machines Lab (ME 214B)
Lession Plan Duration: 15 Weeks (from January,2018 to April,2018
Workload(Lecture/Practical) per week (in hours) : Lecture-04, Practicals -02 hours

Week	Theory		
	Lecture Da	Topic (including assignment/test)	Practical D
1st	1st	Impulse – momentum principle, jet impingement - on a stationary flat plate	1st
	2nd	Inclined plate and a hinged plate, at the center of a stationary vane	
	3rd	On a moving flat plate, inclined plate, a moving vane and a series of vanes	
2nd	4th	Jet striking tangentially at the tip of a stationary vane and moving vane(s), jet propulsion of ships. Problems	2nd
	5th	Classification – impulse and reaction turbines, water wheels	
	6th	component parts, construction, operation and governing mechanism of a Pelton wheel,	
3rd	7th	work done, effective head, available head and efficiency of a Pelton wheel,	3rd
	8th	design aspects, speed ratio, flow ratio, jet ratio,	
	9th	number of jets, number of buckets and working proportions	
4th	10th	Performance Characteristics, governing of impulse turbines. Problems	4th
	11th	Component parts, construction and operation of a Francis turbine	
	12th	governing mechanism, work done by the turbine runner,	
5th	13th	working proportions and design parameters,	5th
	14th	slow, medium and fast runners,	
	15th	degree of reaction, inward/outward flow reaction turbines,	
6th	16th	Performance Characteristics, Problems	6th
	17th	Component parts, construction and operation of a Propeller	
	18th	Kaplan turbine, differences between the Francis and Kaplan turbines	
7th	19th	draft tube - its function and different forms,	7th
	20th	Performance Characteristics, Governing of reaction turbine	
	21st	Introduction to new types of turbine, Deriaz (Diagonal), Bulb, Tubular turbines,	
8th	22nd	Problems	8th
	23rd	Dimensional homogeneity, Rayleigh's method and Buckingham's p-theorem	
	24th	model studies and similitude, dimensionless numbers and their significance	
9th	25th	Unit quantities, specific speed and model relationships for turbines, scale effect,	9th
	26th	Cavitations – its causes, harmful effects and prevention	
	27th	Thomas cavitation factor, permissible installation height, Problems.	
10th	28th	Function, construction and operation of Hydraulic accumulator	10th
	29th	hydraulic intensifier, hydraulic crane	
	30th	hydraulic lift and hydraulic press,	
11th	31st	Fluid coupling and torque converter,	11th
	32nd	Hydraulic ram,	
	33rd	Problems	
12th	34th	Classification, velocity vector diagrams and work done	12th
	35th	manometric efficiency, vane shape, head capacity relationship and pump losses,	

12th	36th	Pressure rise in impeller, minimum starting speed, design considerations, multi-stage pumps.	12th
13th	37th	Similarity relations and specific speed, net positive suction head	13th
	38th	cavitation and maximum suction lift, performance characteristics	
	39th	Brief introduction to axial flow, mixed flow and submersible pumps, Problems.	
14th	40th	Construction and operational details, discharge coefficient, volumetric efficiency and slip	14th
	41st	work and power input, effect of acceleration and friction on indicator diagram (pressure – stroke length plot),	
	42nd	separation, air vessels and their utility, rate of flow into or from the air vessel	
15th	43rd	maximum speed of the rotating crank, characteristic curves,	15th
	44th	Centrifugal vs reciprocating pumps, brief introduction to screw, gear, vane and radial piston pumps, Problems.	
	45th	Revision (Previous year papers)	

Name of faculty:- Mr. Vikram Kapoor (Theory) and Mr. Vikram Kapoor (Practical)
Discipline:-Mechanical
Semester:- 4th
Subject:- ENERGY CONVERSION (ME-210B)
:-ENERGY CONVERSION LAB (ME-216B)
Lesson Plan Duration:-15 week (January 2018 to April 2018)
Work Load (Lecture/Practical) per week (in hours):- Lectures -03, Tutorial – 01, Practicals-02

Week	**Theory**		
	cture (Da	**Topic (including assignment /test)**	**ıctical (Da**
1st	**1st**	Classification of fuels- solid, liquid & gaseous fuels	**1st**
	2nd	Combustion equation, Stochiometric air-fuel ratio	
	3rd	Excess air, Orsat apparatus for exhaust & flue gas, Enthalpy and internal energy of combustion	
2nd	**1st**	Enthalpy of formation, Adiabatic flame temperature, Calorific values of fuel	**2nd**
	2nd	Assignment: Numerical of Fuel and combustion	
	3rd	Classification, comparison between fire and water tube boilers. Essentials of a good boiler, Cons	
3rd	**1st**	High pressure boilers-Benson, Lamont, Loeffler and Velox boilers.	**3rd**
	2nd	Boiler mountings and accessories.	
	3rd	Boiler performance, Natural& Artificial drafts, Chimney height	
4th	**1st**	Maximum draft and chimney efficiency,	**4th**
	2nd	Boiler heat balance sheet	
	3rd	Assignment-Numerical of Chimney height	
5th	**1st**	Carnot Vapour Cycle, Rankine vapour cycles	**5th**
	2nd	Effect of operating conditions on efficiency of Rankine cycle.	
	3rd	Rankine cycle with superheat, Rankine cycle with Reheat and regeneration	
6th	**1st**	Binary vapour cycle	**6th**
	2nd	Assignment: Numerical of Rankine cycle	
	3rd	Velocity and heat drop, Mass discharge through a nozzle	

7th	**1st**	Critical pressure ratio and its significance	**7th**
	2nd	Effect of friction and nozzle efficiency	
	3rd	Supersaturated flow, Relationship between area, velocity & pressure in nozzle flow	
8th	**1st**	Assignment: Numerical of Nozzle ,Test	**8th**
	2nd	Classification of Impulse Turbine- Flow through blades	
	3rd	velocity diagram, power output and efficiency, Maximum blade efficiency of single stage impulse	
9th	**1st**	Compounding of impulse turbine.	**9th**
	2nd	Reaction Turbine-Flow through blades, degree of reaction, velocity diagram, power output,	
	3rd	Blade efficiency and blade height, Comparison of impulse and impulse reaction turbines	
10th	**1st**	Energy losses in steam turbines	**10th**
	2nd	Stage efficiency, Overall efficiency and reheat factor.	
	3rd	Condition for maximum blade efficiency for impulse and reaction turbine	
11th	**1st**	Governing of steam turbines	
	2nd	Assignment: Numerical of impulse turbine	
	3rd	Elements of a condensing plant, Types of condensers	
12th	**1st**	Comparison of jet and surface condensers.	
	2nd	Condenser vacuum	
	3rd	Sources of air leakage & its disadvantages	
13th	**1st**	Vacuum efficiency and condenser efficiency	
	2nd	Determination of mass of cooling water for jet and surface condensers	
	3rd	Cooling ponds and cooling towers	
14th	**1st**	Working of a single stage reciprocating air compressor , Calculation of work input with and with	
	2nd	Volumetric efficiency	
	3rd	Isothermal efficiency, Advantages of multi stage compression	
15th	**1st**	Multi -stage compressor with Inter-cooling	
	2nd	Perfect Inter cooling	
	3rd	Optimum intercooler pressure	

Practical
Topic
To study crystal structures with the help of ball model.
To study crystal structures and crystals imperfections using ball models.
To study hardening (by quenching) of steel specimen by Jominy Test.
To observe effect of tempering temperature on the property

To observe effect of tempering temperature on the property of given steel specimen.
To study the mechanism of chemical corrosion and its protection
To study the properties of various types of plastics
To study Bravais lattices with the help of models.
To study microstructures of metals/ alloys through microscopic observation.

Practical
Topic
To study the constructional details of a Pelton turbine and draw its fluid flow circuit.
To draw the following performance characteristics of Pelton turbine-constant head, Constant-speed and constant efficiency curves.
To study the constructional details of a Francis turbine and draw its fluid flow circuit.
To draw the constant head, constant speed and constant efficiency performance Characteristics of Francis turbine.
To study the construction details of a Kaplan turbine and draw its fluid flow circuit.
To draw the constant head, speed and efficiency curves for a Kaplan turbine.
To study the constructional details of a Centrifugal Pump and draw its characteristic Curves.
To study the constructional details of a Reciprocating Pump and draw its characteristics Curves.
To study the construction details of a Gear oil pump and its performance curves.
To study the constructional details of a Hydraulic Ram and determine its various efficiencies.

Practical
Topic
To study low pressure boilers and their accessories and mountings.
To study high pressure boilers and their accessories and mountings.
To study the working of impulse and reaction steam turbines.
To find the condenser efficiencies.
To study and find volumetric efficiency of a reciprocating air compressor.
To study cooling tower and find its efficiency.

To find calorific value of a sample of fuel using Bomb calorimeter.
To prepare heat balance sheet for given boiler.
To find dryness fraction of steam by separating and throttling calorimeter.
Calibration of Thermometers and pressure gauges.