

Discipline : MECHANICALENGG	Semester : 3rd	Name of the Teaching Faculty: OMPRAKASH KAR
Subject: ENGINEERING MATERIAL	No. of days/per week class allotted: 04	No. of Weeks: 15
Week	Class Day	Theory / Practical Topics
1 ST	1 ST	Material classification into ferrous and non ferrous category and alloys
	2 ND	Material classification into ferrous and non ferrous category and alloys
	3 RD	Properties of Materials: Physical , Chemical and Mechanical Performance requirements
	4 TH	Properties of Materials: Physical , Chemical and Mechanical Performance requirements
2 ND	1 ST	Material reliability and safety
	2 ND	Characteristics and application of ferrous materials
	3 RD	Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel
	4 TH	Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
3 RD	1 ST	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,
	2 ND	Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,
	3 RD	Concept of phase diagram and cooling curves
	4 TH	Concept of phase diagram and cooling curves
4 TH	1 ST	Concept of phase diagram and cooling curves
	2 ND	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	3 RD	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	4 TH	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
5 TH	1 ST	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	2 ND	Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel
	3 RD	Crystal defines, classification of crystals, ideal crystal and crystal imperfections
	4 TH	Crystal defines, classification of crystals, ideal crystal and crystal imperfections
6 TH	1 ST	Classification of imperfection: Point defects, line defects, surface defects and volume defects
	2 ND	Classification of imperfection: Point defects, line defects, surface defects and volume defects
	3 RD	Types and causes of point defects: Vacancies, Interstitials and

		impurities
	4 TH	Types and causes of line defects: Edge dislocation and screw dislocation
7 TH	1 ST	Effect of imperfection on material properties
	2 ND	Deformation by slip and twinning
	3 RD	Effect of deformation on material properties
	4 TH	Effect of deformation on material properties
8 TH	1 ST	Purpose of Heat treatment
	2 ND	Process of heat treatment: Annealing, normalizing, hardening, tempering, stress relieving measures
	3 RD	Process of heat treatment: Annealing, normalizing, hardening, tempering, stress relieving measures
	4 TH	Process of heat treatment: Annealing, normalizing, hardening, tempering, stress relieving measures
9 TH	1 ST	Surface hardening: Carburizing and Nitriding
	2 ND	Surface hardening: Carburizing and Nitriding
	3 RD	Effect of heat treatment on properties of steel
	4 TH	Effect of heat treatment on properties of steel
10 TH	1 ST	Hardenability of steel
	2 ND	Hardenability of steel
	3 RD	Aluminum alloys: Composition, property and usage of Duralmin, γ - alloy.
	4 TH	Aluminum alloys: Composition, property and usage of Duralmin, γ - alloy
11 TH	1 ST	Aluminum alloys: Composition, property and usage of Duralmin, γ - alloy
	2 ND	Copper alloys: Composition, property and usage of Copper- Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
	3 RD	Copper alloys: Composition, property and usage of Copper- Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
	4 TH	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
12 TH	1 ST	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
	2 ND	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
	3 RD	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.
	4 TH	Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.

13 TH	1 ST	Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials
	2 ND	Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials
	3 RD	Classification, composition, properties and uses of Copper
		base, Tin Base, Lead base, Cadmium base bearing materials
	4 TH	Classification, composition, properties and uses of Iron-base and Copper base spring material
14 TH	1 ST	Classification, composition, properties and uses of Iron-base and Copper base spring material
	2 ND	Classification, composition, properties and uses of Iron-base and Copper base spring material
	3 RD	Properties and application of thermosetting and thermoplastic polymers
	4 TH	Properties and application of thermosetting and thermoplastic polymers
15 TH	1 ST	Properties of elastomers
	2 ND	Classification, composition, properties and uses of particulate based and fiber reinforced composites
	3 RD	Classification, composition, properties and uses of particulate based and fiber reinforced composites
	4 TH	Classification and uses of ceramics

Learning Resources:

01. A Textbook of Material Science and Metallurgy, by O P Khanna, Dhanpat Rai
02. Engineering materials and Metallurgy by R K Rajput, S. Chand
03. Material science & process, by S K Hazrath, Indian Book Distributing

GOVERNMENT POLYTECHNIC JAGATSINGHPUR

MECHANICAL ENGINEERING DEPARTMENT LESSON PLAN

Discipline :- Mechanical	Semester:- 3RD	Name of the Teaching Faculty SHYAMA PRASAD SWAIN
Subject:- Environmental Studies	No of Days/per Week Class Allotted :-04	Week-15
Week	Class Day	Theory/ Practical Topics
1 st	1 st	CHAPTER-1: The Multidisciplinary nature of environmental studies Introduction
	2 nd	Definition, scope and importance.
	3 rd	Need for public awareness.
	4 th	CHAPTER-2: Natural Resources: Forest resources: Use and over-exploitation, deforestation, case studies,
2 nd	1 st	Timber extraction mining, dams and their effects on forests and tribal people.
	2 nd	Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
	3 rd	Mineral Resources: Use and exploitation,
	4 th	Environmental effects of extracting and using mineral resources.
3 rd	1 st	Food Resources: World food problems, changes caused by agriculture and over grazing
	2 nd	Effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity
	3 rd	Energy Resources: Growing energy need
	4 th	Renewable and non-renewable energy sources, use of alternate energy sources, case studies.
4 th	1 st	Land Resources: Land as a resource, land degradation, Landslides, soil erosion, and desertification.
	2 nd	Role of individual in conservation of natural resources, Equitable use of resources for sustainable life styles.
	3 rd	CHAPTER-3: Systems: Concept of an eco-system.
	4 th	Structure and function of an eco-system
5 th	1 st	Producers, consumers, decomposers.
	2 nd	Energy flow in the eco systems.
	3 rd	Ecological succession.
	4 th	Food chains, food webs and ecological pyramids
6 th	1 st	Introduction, types, characteristic features of eco system:
	2 nd	structure and function of the following ecosystem: Forest ecosystem, Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).
	3 rd	CHAPTER-4: Biodiversity and it's Conservation: Introduction
	4 th	Definition: genetics, species and ecosystem diversity.

7 th	1 st	Biogeographically classification of India.
	2 nd	Value of biodiversity: consumptive use, productive use,
	3 rd	Value of biodiversity in social ethical, aesthetic and optin values.
	4 th	Biodiversity at global, national and local level.
8 th	1 st	Threats to biodiversity: Habitats loss, poaching of wild life
	2 nd	Threats to biodiversity: man wildlife conflicts.
	3 rd	CHAPTER-5: Environmental Pollution: Definition Causes, effects and control measures of:
	4 th	Air pollution.
9 th	1 st	Water pollution
	2 nd	Soil pollution
	3 rd	Marine pollution
	4 th	Noise pollution.
10 th	1 st	Thermal pollution
	2 nd	Nuclear hazards.
	3 rd	Solid waste Management: Causes
	4 th	Effects and control measures of urban and industrial wastes.
11 th	1 st	Role of an individual in prevention of pollution.
	2 nd	Disaster management: Floods, earth quake, cyclone and landslides.
	3 rd	CHAPTER-6: Social issues and the Environment: Form unsustainable to sustainable development.
	4 th	Urban problems related to energy.
12 th	1 st	Water conservation, rain water harvesting, water shed management
	2 nd	Resettlement and rehabilitation of people; its problems and concern
	3 rd	Environmental ethics: issue and possible solutions
	4 th	Climate change, global warming, acid rain,
13 th	1 st	Ozone layer depletion, nuclear accidents and holocaust, case studies.
	2 nd	Air (prevention and control of pollution) Act.
	3 rd	Water (prevention and control of pollution) Act.
	4 th	Public awareness.
14 th	1 st	CHAPTER-7: Human population and the environment: introduction
	2 nd	Population growth and variation among nations.
	3 rd	Population explosion- family welfare program.
	4 th	Environment and human health.
15 th	1 st	Human rights.
	2 nd	Value education
	3 rd	Role of information technology in environment and human health
	4 th	Important question discussion

Discipline :MECHANICAL ENGG	Semester :3 rd	Name of the Teaching Faculty: MUKESH KU. DALEI
Subject:Producti on Technology	No. of days/per week class allotted:0 4	No. of Weeks:15
Week	Class Day	Theory / Practical Topics
1 ST	1 ST	Extrusion: Definition & Classification
	2 ND	Explain direct, indirect and impact extrusion process.
	3 RD	Define rolling .Classify it.
	4 TH	Define rolling. Classify it.
2 ND	1 ST	Differentiate between cold rolling and hot rolling process
	2 ND	List the different types of rolling mills used in Rolling process
	3 RD	List the different types of rolling mills used in Rolling process
	4 TH	Define welding and classify various welding processes.
3 RD	1 ST	Define welding and classify various welding processes
	2 ND	Explain fluxes used in welding.
	3 RD	Explain Oxy-acetylene welding process.
	4 TH	Explain various types of flames used in Oxy-acetylene welding process.
4 TH	1 ST	Explain Arc welding process.
	2 ND	Specify arc welding electrodes.
	3 RD	Define resistance welding and classify it.
	4 TH	Define resistance welding and classify it.
5 TH	1 ST	Describe various resistance welding processes such as butt welding,spotwelding,flashwelding,projectionweldingandseamwelding
	2 ND	Describe various resistance welding processes such as butt welding,spotwelding,flashwelding,projectionweldingandseamwelding.
	3 RD	Describe various resistance welding processes such as butt welding, spot welding, flash welding, projection welding andseam welding.
	4 TH	Explain TIG and MIG welding process
6 TH	1 ST	State different welding defects with causes and remedies
	2 ND	State different welding defects with causes and remedies
	3 RD	State different welding defects with causes and remedies
	4 TH	Define Casting and Classify the various Casting processes.
7 TH	1 ST	Define Casting and Classify the various Casting processes
	2 ND	Define Casting and Classify the various Casting processes
	3 RD	Explain the procedure of Sand mould casting.
	4 TH	Explain different types of molding sands with their composition and properties
8 TH	1 ST	Explain different types of molding sands with their composition and properties
	2 ND	Classify different pattern and state various pattern allowances
	3 RD	Classify different pattern and state various pattern allowances
	4 TH	Classify core.
9 TH	1 ST	Describe construction and working of

		cupola and crucible furnace
	2 ND	Describe construction and working of cupola and crucible furnace.
	3 RD	Explain die casting method.
	4 TH	Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application.
10 TH	1 ST	Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application.
	2 ND	Explain various casting defects with their causes and remedies
	3 RD	Explain various casting defects with their causes and remedies
	4 TH	Define powder metallurgy process.
11 TH	1 ST	Define powder metallurgy process.
	2 ND	State advantages of powder metallurgy technology technique
	3 RD	Describe the methods of producing components by powder metallurgy technique.
	4 TH	Describe the methods of producing components by powder metallurgy technique
12 TH	1 ST	Explain sintering.
	2 ND	Economics of powder metallurgy
	3 RD	Describe Press Works: blanking, piercing and trimming.
	4 TH	Describe Press Works: blanking, piercing and rimming.
13 TH	1 ST	List various types of die and punch
	2 ND	Explain simple, Compound & Progressive dies
	3 RD	Explain simple, Compound & Progressive dies
	4 TH	Describe the various advantages & disadvantages of above dies
14 TH	1 ST	Describe the various advantages & disadvantages of above dies
	2 ND	Define jigs and fixtures
	3 RD	State advantages of using jig and fixtures
	4 TH	State the principle of locations
15 TH	1 ST	Describe the methods of location with respect to 3-2-1 point location of rectangular jig
	2 ND	Describe the methods of location with respect to 3-2-1 point location of rectangular jig
	3 RD	List various types of jig and fixtures.
	4 TH	List various types of jig and fixtures.

Learning Resources:

01. Production Technology, Vol-I&II by O.P. Khanna, Dhanpat Rai Publication
02. Workshop technology, Vol-I&II by B.S. Raghuvanshi, Dhanpat Rai & Co
03. Manufacturing technology, Vol-I&II by P.N. Rao, TMH
04. Manufacturing technology, Vol-I by P.C. Sharma, S. Chand

Discipline :MECHANICAL ENGG	Semester :3 rd	Name of the Teaching Faculty: PRIYABRATA PANDA
Subject:STRENGTH OF MATERIAL	No. of days/week class allotted: 04	No. of Weeks: 15
Week	Class Day	Theory / Practical Topics
1 ST	1 ST	Types of load, stresses & strains,(Axial and tangential),
	2 ND	Hooke's law, Young's modulus, bulk modulus, modulus of rigidity,
	3 RD	Poisson's ratio, derive the relation between three elastic constants
	4 TH	Principle of super position, stresses in composite section
2 ND	1 ST	Temperature stress, determine the temperature stress in composite bar (single core)
	2 ND	Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load
	3 RD	Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load
	4 TH	Simple problems on above
3 RD	1 ST	Simple problems on above
	2 ND	Simple problems on above
	3 RD	Definition of hoop and longitudinal stress, strain
	4 TH	Definition of hoop and longitudinal stress, strain
4 TH	1 ST	Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	2 ND	Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain
	3 RD	Computation of the change in length, diameter and volume
	4 TH	Simple problems on above
5 TH	1 ST	Simple problems on above
	2 ND	Simple problems on above
	3 RD	Determination of normal stress, shear stress and resultant stress on oblique plane
	4 TH	Determination of normal stress, shear stress and resultant stress on oblique plane
6 TH	1 ST	Determination of normal stress, shear stress and resultant stress on oblique plane
	2 ND	Location of principal plane and computation of principal stress
	3 RD	Location of principal plane and computation of principal stress
	4 TH	Location of principal plane and computation of principal stress
7 TH	1 ST	Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	2 ND	Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	3 RD	Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle
	4 TH	Location of principal plane and computation of principal stress and Maximum

		shear stress using Mohr's circle
8 TH	1 ST	Types of beam and load
	2 ND	Types of beam and load
	3 RD	Types of beam and load
	4 TH	ConceptsofShearforceandbendingmoment
9 TH	1 ST	ConceptsofShearforceandbendingmoment
	2 ND	ConceptsofShearforceandbendingmoment
	3 RD	ShearForceandBendingmomentdiagramanditssalientfeaturesillustration in cantilever beam, simply supported beam and overhangingbeamunderpointloadanduniformlydistributedload
	4 TH	ShearForceandBendingmomentdiagramanditssalientfeaturesillustration in cantilever beam, simply supported beam and overhangingbeamunderpointloadanduniformlydistributedload
10 TH	1 ST	ShearForceandBendingmomentdiagramanditssalientfeaturesillustration in cantilever beam, simply supported beam and overhangingbeamunderpointloadanduniformlydistributedload
	2 ND	ShearForceandBendingmomentdiagramanditssalientfeaturesillustration in cantilever beam, simply supported beam and overhangingbeamunderpointloadanduniformlydistributedload
	3 RD	Assumptionsinthetheoryofbending,
	4 TH	Assumptionsinthetheoryofbending,
11 TH	1 ST	Bendingequation,Momentofresistance,Sectionmodulus&neutralaxis.
	2 ND	Bendingequation,Momentofresistance,Sectionmodulus&neutralaxis.
	3 RD	Bendingequation,Momentofresistance,Sectionmodulus&neutralaxis.
	4 TH	Solvesimpleproblems
12 TH	1 ST	Solvesimpleproblems
	2 ND	Solvesimpleproblems
	3 RD	Solvesimpleproblems
	4 TH	Solvesimpleproblems
13 TH	1 ST	Definecolumn
	2 ND	Axialload,Eccentricloadoncolumn
	3 RD	Directstresses,Bendingstresses,Maximum&Minimumstresses.Numerical problemson above.
	4 TH	Directstresses,Bendingstresses,Maximum&Minimumstresses.Numerical problemson above.
14 TH	1 ST	BucklingloadcomputationusingEuler'sformula(noderivation)inColumns withvariousendconditions
	2 ND	BucklingloadcomputationusingEuler'sformula(noderivation)inColumns withvariousendconditions
	3 RD	Assumptionofpuretorsion
	4 TH	Thetorsionequationforsolidandhollowcircularshaft
15 TH	1 ST	Thetorsionequationforsolidandhollowcircularshaft

	2 ND	The torsion equation for solid and hollow circular shaft
	3 RD	Comparison between solid and hollow shaft subjected to pure torsion
	4 TH	Comparison between solid and hollow shaft subjected to pure torsion

Learning Resources:

01. Strength of Materials, by SRamamrutham, Dhanpat Rai
02. Strength of Materials by RK Rajput, S. Chand
03. Strength of Materials, by R. Skhurmi, S. Chand
04. Strength of Materials, by GHRyder, Mcmillon and co. lmtd
05. Strength of Materials by S Timoshenko and DH, TMH

ANTARYAMI BERA
Mech. Engg. Dept.

Discipline : MECHANICALENGG	Semester : 3rd	Name of the Teaching Faculty: SABYASACHI JAGANNATH MISHRA.
Subject: THERMAL ENGINEERING-I	No. of days/per week class allotted: 04	No. of Weeks: 15
Week	Class Day	Theory / Practical Topics
1 ST	1 ST	Thermodynamic Systems (closed, open, isolated) enthalpy, Internal energy and units of measurement).
	2 ND	Thermodynamic properties of a system (pressure, volume, temperature, entropy,
	3 RD	Thermodynamic properties of a system (pressure, volume, temperature, entropy,
	4 TH	Intensive and extensive properties
2 ND	1 ST	Define thermodynamic processes, path, cycle , state, path function, point function
	2 ND	Define thermodynamic processes, path, cycle , state, path function, point function
	3 RD	Thermodynamic Equilibrium.
	4 TH	Quasi-static Process.
3 RD	1 ST	Conceptual explanation of energy and its sources
	2 ND	Work , heat and comparison between the two
	3 RD	Mechanical Equivalent of Heat.
	4 TH	Work transfer, Displacement work
4 TH	1 ST	State & explain Zeroth law of thermodynamics.
	2 ND	State & explain First law of thermodynamics.
	3 RD	Limitations of First law of thermodynamics
	4 TH	Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor)
5 TH	1 ST	Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor)
	2 ND	Second law of thermodynamics (Claucius& Kelvin Plank statements).
	3 RD	Second law of thermodynamics (Claucius& Kelvin Plank statements).
	4 TH	Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P
6 TH	1 ST	Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P (solve simple numerical)
	2 ND	(solve simple numerical)
	3 RD	(solve simple numerical)
	4 TH	(solve simple numerical)
7 TH	1 ST	Laws of perfect gas: Boyle's law, Charle's law, Avogadro's law, Dalton's law of partial pressure, Guy lussac law, General gas equation, characteristic gas constant, Universal gas constant.
	2 ND	Laws of perfect gas: Boyle's law, Charle's law, Avogadro's law, Dalton's law of partial pressure, Guy lussac law, General gas equation, characteristic gas constant, Universal gas constant.

	3 RD	Explain specific heat of gas (Cp and Cv)
	4 TH	Relation between Cp&Cv
8 TH	1 ST	Enthalpy of a gas.
	2 ND	Work done during a non- flow process.
	3 RD	Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric, Isentropic and polytropic process)
	4 TH	Solve simple problems on above.
9 TH	1 ST	Solve simple problems on above.
	2 ND	Free expansion & throttling process
	3 RD	Explain & classify I.C engine.
	4 TH	Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM.
10 TH	1 ST	Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM.
	2 ND	Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine
	3 RD	Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine
	4 TH	Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine
11 TH	1 ST	Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine
	2 ND	Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine
	3 RD	Carnot cycle
	4 TH	Otto cycle
12 TH	1 ST	Diesel cycle.
	2 ND	Dual cycle
	3 RD	Solve simple numerical
	4 TH	Solve simple numerical
13 TH	1 ST	Solve simple numerical
	2 ND	Solve simple numerical
	3 RD	Solve simple numerical
	4 TH	Solve simple numerical
14 TH	1 ST	Define Fuel.
	2 ND	Types of fuel.
	3 RD	Application of different types of fuel.
	4 TH	Application of different types of fuel.
15 TH	1 ST	Heating values of fuel.
	2 ND	Quality of I.C engine fuels Octane number, Cetane number.
	3 RD	Quality of I.C engine fuels Octane number, Cetane number.
	4 TH	Quality of I.C engine fuels Octane number, Cetane number.

Learning Resouces:

01. Thermal Engineering, by R.S.Khurmi, S.Chand
02. Thermal Engineering by A.R.Basu, Dhanpat Rai
03. Thermal Engineering, by A.S.Sarao, Satya Prakash
04. Engineering Thermodynamics, by P.K.Nag, TMH
05. Thermal Engineering by Mahesh M Rathore, TMH

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