UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Numerical Methods
Course Code: M(CS)401
L-T Scheme: 2-1 **Course Credits: 3**

Introduction:

This course offers an advanced introduction to numerical linear algebra. Topics include direct and iterative methods for linear systems, eigenvalue decompositions and QR/SVD factorizations, stability and accuracy of numerical algorithms, the IEEE floating point standard, sparse and structured matrices, preconditioning and linear algebra software. Problem sets require some knowledge of MATLAB

Objectives:

The primary goal is to provide engineering majors with a basic knowledge of numerical methods including: root finding, elementary numerical linear algebra, integration, interpolation, solving systems of linear equations, curve fitting, and numerical solution to ordinary differential equations'' language and SCILAB is the software environment used for implementation and application of these numerical methods. The numerical techniques learned in this course enable students to work with mathematical models of technology and systems.

Learning Outcomes:

Knowledge:

1. Students would be able to assess the approximation techniques to formulate and apply appropriate strategy to solve real world problems.
2. Be aware of the use of numerical methods in modern scientific computing.
3. Be familiar with finite precision computation.
4. Be familiar with numerical solution of integration, linear equations, ordinary differential equations, interpolations.

Application:

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to design and conduct experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints
4. such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
5. An ability to function on multidisciplinary teams

Course Contents:

Unit 1: Approximation in numerical computation: Approximation of numbers, Types of errors, Calculation of errors.

Unit 2: Interpolation: Finite Differences and Divided differences, Newton forward/backward Interpolation, Lagrange's method and Newton's divided difference method.

Unit 3: Numerical integration: Trapezoidal rule and Simpson's 1/3 rule.

Unit 4: Numerical solution of a system of linear equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.

Unit 5: Numerical solution of Algebraic equation: Bisection method, Regula-Falsi method, Newton-Raphson method and order of convergence.

Unit 6: Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, Predictor-Corrector methods and Finite Difference method.

Text Books

1. Dutta& Jana: Introductory Numerical Analysis(All course).

2. Dr.B.S.Grewal:Numerical Methods in Engineering &science(All Course).

3. Jain, Iyengar ,& Jain: Numerical Methods (Problems and Solution).

References

1. Baburam: Numerical Methods, Pearson Education.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Values & Ethics in Profession
Course Code: HU401
L-T Scheme: 3L+1T **Course Credits: 3**

Introduction:

This course teaches students the basic principles of Values and Ethics within profession. These deals mainly with

- Values in professional life
- Ethics in professional life
- Resources depletion
- Conservation of resources for future generations
- Technology transfer
- Eco friendly Technology
- Value crisis in society
- Present society without values and Ethics.

Objectives:

This course relates to the present world and teaches students the need and importance of values and the problems faced by the present society in terms of depletion of natural resources and how to control the same for the sake of future generations.

Learning Outcomes:

Knowledge:

1. Understand the present scenario of degradation of values and Ethics system
2. Depletion of resources and how to conserve them.
3. Club Of Rome and what all stalwarts have thought to improve the situation
4. Sustainable Development.
5. Value spectrum of a good life
6. Present societal changes in terms of values and ethics
7. What steps to be taken to improve value system?
8. How to avoid conflicts to have a peaceful job life.
9.

Course Contents:

Unit 1: Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: Sustainable development Energy Crisis: Renewable Energy Resources Environmental degradation and pollution. co-friendly Technologies. Environmental Regulations, Environmental Ethics Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis. Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Unit 2: Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond.

Unit 3: Values Crisis in contemporary society Nature of values: Value Spectrum Of good life Psychological values: Integrated personality; mental health Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Books:

AN Tripathi ,Human values in the Engineering Profession, Monograph published byIIM,Calcutta1996

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Fluid mechanics & Hydraulic Machines
Course Code: ME401
L-T Scheme: 4-0 **Course Credits: 4**

Course Objectives:

- To introduce the students to fundamental concepts and terminologies involved in fluid mechanics and the effect of hydrostatic pressure on the submerged body.
- To enable the students to understand the Kinematics of fluid flow to solve real life fluid engineering problems.
- To introduce the students to real world of fluid dynamics and its utility in running hydraulic machines.
- To familiarize the students with the concept Momentum and its Analysis for various devices.
- To familiarize the students with measurement equation of friction losses in pipes like Darcy – Weisbach equation.
- To introduce the students with flow measuring devices for open channes like notches & weirs.
- To enable the students to understand the concept of Dimensional Analysis & Model investigation applied to flow systems

Course Outcomes:

At the end of the course, the student will be able to :

- Understand fluid properties and their significance, concept of fluid pressure on different shapes of submerged body.
- Visualise different types of fluid flow, and compare them based on kinematic flow descriptions. Develop continuity equations in 1D & 3D.
- Describe the Bernoulli's equation and Eulers equations and its significances.
- Understand how mass and momentum is conserved based on Bernoulli's & Newton's laws and its applications
- Describe various losses in pump flow and friction loss through pipes.
- Understand the basic principle of flow measurement used for open channels.
- Conceptualise the Dimensional Analysis method for various flow systems,
  State dimensionless parameter and its importance.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Course Contents:

Module 1:

Introduction: Fluid Properties: Definition of a fluid, Viscosity-dynamic and kinematic, Surface Tension. Fluid Statics: Basic equation of fluid statics, Manometers, Force on plane areas and curved surfaces, center of pressure, Buoyant force, Stability of floating and Submerged bodies.

Module 2:

Kinematics of fluid flow: fluid flow and classifications. Continuity equation in 1D & 3D. Potential flow & Stream function; types of flow lines.

Module 3:

Dynamics of fluid: equations of motion; Euler's equation; Bernoulli's equation; Applications of Bernoulli's equation.

Module 4:

Momentum Analysis of flow systems; the linear momentum equation for steady flow, Momentum equation and its applications

Module 5:

Flow through pipes; Darcy – Weisbach equation of friction loss; Major and minor Losses in pipe

Hydraulic grade line and total energy line.

Module 6:

Basic principle for flow through orifices, V-notches (rectangular-v), weirs (rectangular). Flow through open channels; use of Chezy's formula.

Module 7:

Dimensional Analysis & Model investigation applied to flow systems – Buckingham Pi theorem.

Module 8:

Hydraulic press, Hydraulic accumulator, Hydraulic Ram, Hydraulic lift, Hydraulic coupling, Hydraulic torque convertor Gear pump.

Module 9:

Hydraulic Turbines; Principles and Classifications; working principle of a Pelton Wheel, Francis Turbine, Kaplan Turbine. Function of Draft Tube. Cavitation in Turbines.

Text Books:

1. Fluid Mechanics & hydraulic machines – R.K.Bansal, Luxmi Publications.

References:

1. Fluid Mechanics and Fluid Power Engineering - Dr. D.S. Kumar
2. Fluid Mechanics – Fundamentals & Applications – Cengel & Cimbala, TMH.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Primary Manufacturing Processes
Course Code: ME402
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

Intro to Manufacturing Technology is a broad exploratory course that introduces students to the manufacturing industry. Though hands-on activities students will learn how manufactures use technology to change raw materials into finished products. The course will include: a brief history of manufacturing, social impacts, types of manufacturing production, design processes, properties of materials, manufacturing processes, safe use of tools and equipment, free enterprise and marketing principles, and career exploration.

The topics to be covered (tentatively) include:

- Engineering Materials
- Casting processes
- Welding processes
- Forming processes

Objectives and Learning Outcomes:

Course Objective: To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.

Objective 1: To make the students understand fundamentals of **CASTING** : Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems.

Objective 2: To provide insight into sand casting and introduce other casting processes Methods of melting and types of furnaces, Solidification of castings, Solidification of pure metals and alloys, short & long freezing range alloys. Risers – Types, function and design, casting design considerations, Basic principles and applications of Centrifugal casting, Die casting and Investment casting.

Objective 3: To impart fundamentals of gas welding and arc **Welding :** Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, Manual metal arc welding, Sub merged arc welding, Inert Gas welding- TIG & MIG welding.

Objective 4: To teach principles of advanced welding processes and their applications Resistance welding, Solid state welding processes- Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma welding, Laser welding, electron beam welding, Soldering & Brazing. Heat affected zones in welding; pre & post heating, Weld ability of metals, welding defects – causes and remedies – destructive and non-destructive testing of welds, Design of welded joints.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Objective 5: To impart knowledge on bulk forming processes Plastic deformation in metals and alloys, Hot working and Cold working, Strain hardening and Annealing. Bulk forming processes: Forging - Types Forging, Smith forging, Drop Forging, Roll forging, Forging hammers, Rotary forging, forging defects; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing. Introduction to powder metallurgy – compaction and sintering, advantages and applications

Objective 6: To provide understanding of various sheet metal forming and processing of plastics. Sheet metal forming - Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Springbuck and its remedies, Coining, Spinning, Types of presses and press tools. Processing of Plastics: Types of Plastics, Properties, Applications and their processing methods, Blow and Injection moulding.

TEXT BOOKS:

1. Manufacturing Processes for Engineering Materials - Kalpakjian S and Steven R SchmidPearson Publ , 5th Edn.
2. Manufacturing Technology -Vol I- P.N. Rao- TMH
3. Fundamentals of Modern Manufacturing - Mikell P Groover- Wiley publ – 3 rd Edition.

REFERENCES:

1. Manufacturing Science – A.Ghosh & A.K.Malik – East West Press Pvt. Ltd.
2. Production Technology- R.K. Jain- Khanna
3. Production Technology-P C Sharma-S. Chand

Course Contents:

Unit1: Introduction

Unit 2: Casting: History, Definition, Major Classification Casting Materials, **Sand mould casting** Moulding sands: composition, properties & testing, Design of gating system: sprue, runner, ingate & riser, Estimation of powering time, Foundry equipments, Furnaces Melting, pouring and solidification, Type of patterning, use of a core, Different type of sand mould casting, Floor mould casting, Centrifugal casting, Shell mould & CO2 casting, Investment casting, Permanent mould casting, Die casting, types, methods, advantages & applications, Slush casting, principle & use, Casting defects, types, causes & remedy.

Unit 3: (Welding Process and Forming)

Introduction to metallic parts, Major grouping of joining processes, welding, brazing and soldering, Broad classification of welding processes, types and principles, Fusion welding, types, principles, equipments, characteristics & applications, Sources of heat-chemical action, Gas welding & thermit welding, Sources of heat-electrical energy, Arc welding, Submerged arc welding, TIG & MIG; Plasma arc welding, Resistance welding; Spot & butt welding, Solid state welding Principles, advantages & applications of: Hot forge welding, Friction welding, Pressure & percussion welding, Precision welding

processes: Ultrasonic welding, Laser beam welding, Electron beam welding, Welding defects, types, causes & remedy.
Forging: Introduction, definition, classification, hot forging & cold forging,: characteristics & applications, Forging material operations, equipments & tools: Smith forging, Drop forging, Pressing or press forging, Forging dies, materials & design, Rolling: Introduction, basic principles, hot rolling & cold rolling, characteristics & applications Rolling processes & applications, operations, equipments & roll Stands, Wire drawing & extensions: Basic principles & requirements, Classification, methods & applications, Press tool works Basic principles, systems, operations & applications, Shearing, parting, blanking, piercing & notching, Cupping(drawing), Spinning & deep drawing Blanks & forces needed for shearing & drawing operations, Coining & embossing.

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UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Mechanisms
Course Code: ME 403
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

The course is designed to cover the following subjects: Difference between Machine and Mechanism, Velocity analysis in Mechanisms, Belt-drive – introduction, Gear terminology, Cams and followers, Kinematic Synthesis.

OBJECTIVES:

1. To understand the basic components and layout of linkages in the assembly of a system / machine.
2. To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
3. To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.
4. To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.

OUTCOMES:

Upon completion of this course, the students can able to apply fundamentals of mechanism for the design of new mechanisms and analyse them for optimum design.

UNIT I

Introduction to mechanisms, Difference between Machine and Mechanism; Classification of Pairs of Elements, Kinematic chain, types of joints in a chain; Four-bar linkage: motions of links, Grashof's criterion of movability.
Degrees of freedom for plane Mechanisms, Gruebler's criterion for plane mechanism, Kinematicinversions – four Inversions of a Slider-Crank Chain.

UNIT II

Velocity analysis in Mechanisms: Relative velocity method – slider crank mechanism, four bar mechanism, Crank and slotted lever mechanism; Instantaneous centre method –kennedy's theorem; Acceleration analysis: Acceleration Images, Klein's construction, analytical expression of velocity & acceleration.

UNIT III

Belt-drive – introduction; Law of belting, Length of flat belt for open and cross belt connections; Stepped pulley for open flat belt; Tension in flat belt and V-belts; Power transmitted in belt drive

UNIT IV

Gear terminology, Laws of gearing, types of gears – Spur, Bevel, Helical, Worm; tooth profile, interference; Gear trains – simple, compound, epicyclic gear train; Speed-torque analysis of gear trains.

UNIT V

Classification of Cams and followers; Radial Cam, Analysis of knife-edge, roller and flat face follower motion – constant velocity, simple harmonic, constant acceleration & deceleration; Offset follower.

UNIT VI

Kinematic Synthesis: Introduction to problems of function generation, path generation and rigid body guidance; Type, Number and Dimensional Synthesis; Two and three position synthesis of four bar mechanism and slider –crank mechanism : Graphical – pole, Relative pole and Inversion method; Analytical solution - Freudenstein's Method.
Study of lower pair Mechanisms- Pantograph, Parallel linkage mechanisms, Straight line mechanism, Automobile steering mechanism, Hooks joint.

TEXT BOOKS:

1. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 3rd Edition, Oxford University Press, 2009.
2. Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.

REFERENCES:

1. Thomas Bevan, "Theory of Machines", 3rd Edition, CBS Publishers and Distributors, 2005.
2. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
3. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2009.
4. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961
5. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi, 1988.
6. Rao.J.S. and Dukkipati.R.V. "Mechanisms and Machine Theory", Wiley-Eastern Ltd., New Delhi, 1992.
7. John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low-Prices Student Edition, 1999.
8. Ramamurthi. V, "Mechanics of Machines", Narosa Publishing House, 2002.
9. Khurmi, R.S., "Theory of Machines",14th Edition, S Chand Publications, 2005
10. Sadhu Sigh : Theory of Machines, "Kinematics of Machine", Third Edition, Pearson Education,2012

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Numerical Methods Lab
Course Code: M(CS)491
L-T–P Scheme: 0-0-3 **Course Credits: 2**

Introduction:

This course offers an advanced introduction to numerical linear algebra. Topics include direct and iterative methods for linear systems, eigen value decompositions and QR/SVD factorizations, stability and accuracy of numerical algorithms, the IEEE floating point standard, sparse and structured matrices, preconditioning and linear algebra software. Problem sets require some knowledge of MATLAB

Objectives:

1. To give an overview of what can be done.
2. To give insight into how it can be done.
3. To give the confidence to tackle numerical solutions.
4. An understanding of how a method works aids in choosing a method. It can also provide an indication of what can and will go wrong, and of the accuracy which may be obtained.
5. To gain insight into the underlying physics.
6. The aim of this course is to introduce numerical techniques that can be used on computers, rather than to provide a detailed treatment of accuracy or stability.

Learning Outcomes:

Knowledge:

On completion of this course, the student will be able to:

1. Demonstrate skills in using computer programming tools for engineering calculations.
2. Demonstrate ability to construct simple computer algorithms using a programming tool.
3. Apply simple numerical methods to solve mathematical problems with relevance to civil engineering.
4. Appreciate the limitations and the applicability of the numerical methods.
5. Apply computer-based numerical methods for the solution of engineering problems.

Course Contents:

1. Assignments on Newton forward /backward, Lagrange's interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.
3. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.
4. Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson methods.
5. Assignments on ordinary differential equation: Euler's and Runga-Kutta methods.
6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica.

Text Books:

1. Introductory method of numerical analysis, Sastry S.S
2. Computer Programming in fortran 77, Rajaraman V
3. Numerical methods: for scientific and engineering computation,Mahinder Kumar Jain

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Fluid mechanics& Hydraulic Lab **Course Code: ME-491**
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To learn and understand basic principles of fluid mechanics, Fluid properties and fundamentals of Fluid statics and fluid flow
2. To know the application of fluid mechanics by the inclusion of fluid machinery.
3. To provide an understanding of the hydraulic machines design aspects and practical application.
4. To introduce the concepts of flow measurements and flow through pipes .

Learning Outcomes: The students will have a detailed knowledge of the concepts of Fluid mechanics.The purpose of this course is to learn the Fluid properties and fundamentals of Fluid statics and fluid flow and apply them to practical engineering system design and development. The purpose of this course is to learn the Fluid properties and fundamentals of Fluid statics and fluid flow. Student will learn the concepts of flow measurements and flow through pipes, knowledge of the pumps and turbines, knowledge of impact of jets.
. Upon the completion of Fluid mechanics& Hydraulic Lab, the student will be able to:

- **Understand** and implement basic concepts of fluid mechanics.
- Know the definitions of fundamental concepts of fluid mechanics including: continuum, velocity field; viscosity, surface tension and pressure (absolute and gage); flow visualization using timelines, pathlines, streaklines, and streamlines; flow regimes: laminar, turbulent and transitional flows; compressibility and incompressibility; viscous and inviscid.
- Apply the basic equation of fluid statics to determine forces on planar and curved surfaces that are submerged in a static fluid; to manometers; to the determination of buoyancy and stability; and to fluids in rigid-body motion.
- Ability to analyze fluid flow problems with the application of the momentum and energy equations.

Course Contents:

Experiments that must be done in this course are listed below:
Experiment No.1: Determining coefficient of discharge for venturimeter.
Experiment No.2: Determining coefficient of discharge for orificemeter.
Experiment No 3: Experiment to verify Bernouli's theorem.
Experiment No.4: Flow through pipes.
Experiment No.5: Reynold's experiments
Experiment No.6: Study of pressure measuring devices.
Experiment No.7: Determination of metacentric height of a floating vessel
Experiment No.8: Study of fluid machinery pumps & compressors.
Experiment No.9: Study of francis turbine or pelton turbine.
Experiment No.10: friction in pipes.

Text books:

1. Fluid Mechanics, Hydraulic and hydraulic machines by **Modi** and **Seth**, Standard book house.
2. Open channel flow by **K.Subramanya** , Tata Mc.Grawhill publishers.
3. Fluid mechanics & fluid machines by Narayana pillai, universities press.

Reference Text Books:-

1. Fluid Mechanics & fluid machines by Rajput , S.Chand &co.
2. Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education
3. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
4. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
5. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Pub.(P) ltd., New Delhi.
6. Fluid Mechanics and Machinery by D. Ramdurgaia New Age Publications.

Recommended Equipments/Systems/Software Requirements:

1. venturimeter., orificemeter, bernoulis apparatus, Reynold's apparatus, pitot tube.
2. Fluid pumps, fluid turbines.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Manufacturing Techonology Lab **Course Code: ME492**
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. The objective of the laboratory is learning. The experiments are designed to illustrate phenomena in different areas of Workshop and to expose you to uses of instruments.
2. To provide an understanding of the design aspects of machines.
3. To provide an efficient understanding of the equipments and their functioning.

Learning Outcomes: The students will have a detailed knowledge of the concepts of process of workshop equipments and their use in various areas of mechanical engineering. Upon the completion of practical course, the student will be able to:

- **Understand** and implement basic services and functionalities of the machines using tools and equipments.
- **Use** modern manufacturing technology to understand outlined process of production.
- **Understand** the benefits of newly manufactured parts and designs.
- **Analyze** the dimensions of job and measurements to be taken in account.
- **Implement** the manufacturing processes in competition of different jobs.
- **Understand** the concepts of different operations conducted on milling, shaper andworking in smithy and forging.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Smithy & Forging operation
Exercise No. 2: Operation on Shaper machine
Exercise No. 3: Operation on Drilling machine
Exercise No. 4: Operation on grinding machine
Exercise No. 5: Machining spur gear

Text Book:

1. Hazra Choudhary, Media Promoters & Publishers Pvt Ltd.
2. Ashish Dutt Sharma, S. Chand

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: MATERIAL TESTING LAB **Course Code: ME-493**
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. The objective of this course is to understand the characteristics and behavior of mechanical engineering materials.
2. Students will learn standard principles and procedure to design prepare and/or test materials.
3. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.
4. Students will have exposure to practical applications including writing of a technical report related to each experiment.
5. To investigate the conventional heat treatment procedures, such as quenching and annealing, used to alter the properties of steels.

Learning Outcomes: The Students will learn standard principles and procedure to design prepare and/or test materials. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions
The purpose of this course is to learn the mechanical properties and fundamentals of material testing.
. Upon the completion of material testing lab, the student will be able to:

- **Understand** the characteristics and behavior of mechanical engineering materials. .
- Interpret and quantitatively determine standard mechanical properties.
- Conduct a meaningful hardness, tensile, and impact test and report the test results in a clear and useful manner.
- Determine appropriate tests to be employed to determine given mechanical properties using both destructive and non-destructive techniques.
- Assess and describe the mechanisms leading to failure when provided with a failure example with an unknown cause.
- Ability to analyze heat treatment of carbon steels under different rates of cooling including quenching, and change in hardness and observing its microstructural changes through metallographic studies.

Course Contents:
Experiments that must be done in this course are listed below:
Experiment No.1: Izod impact test.
Experiment No.2: Charpy impact test.
Experiment No 3: Test for drawability of sheet-metals through cupping test.
Experiment No.4: Fatigue test of a typical sample.
Experiment No.5: Sample preparation and etching of ferrous and non-ferrous metals and alloys for metallographic observation
Experiment No.6: Study of heat treatment Processes.
Experiment No.7: Study of non-destructive techniques, such as dye penetration (DP) Test, ultrasonic or eddy-current test.

Text books:
Materials science and engineering: an introduction (7th edition), William D. Callister, Jr., John Wiley and Sons, (2007).
Chandler, H., Heat Treater's Guide, 2nd ed., ASM International, Metals Park, OH, 1995..
Materials Science and Engineering: by Raghavan V.
Dieter, G.E., ***Mechanical metallurgy***, 1988, SI metric edition, McGraw-Hill,

Recommended Equipments/Systems/Software Requirements:

1. Impact testing machine, MS Specimen, cupping test apparatus.
2. Microscope, fatigue test apparatus

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Machine Drawing Lab
Course Code: ME494
L-T –P Scheme: 3L **Course Credits: 2**

Introduction:

Technical Graphics is used to communicate the necessary technical information required for manufacture and assembly of machine components. These drawings follow rules laid down in national and International Organizations for Standards (ISO).

Hence the knowledge of the different standards is very essential. Students have to be familiar with industrial drafting practices and thorough understanding of production drawings to make themselves fit in industries. The following topics have been covered to fulfill the above objectives.

Objectives:

Student will get methodically and well thought out presentation that covers fundamental issues common to almost all areas of machine drawing.

1. Students have an ability to apply knowledge of Modeling, science & engineering.
2. Student can model this drawing even in CAD/CAM software by applying the basic knowledge of machine drawing.
3. Students will able to demonstrate an ability to design and conduct experiments, analyze and interpret data and assembly and disassembly drawings knowledge will be provided.

Learning Outcomes:

At the successful completion of course, the student is able to:

1. Analysis of complex design systems related to mechanical Engineering.
2. Making use of appropriate laboratory tools and design innovative methods.
3. To motivate students to develop new innovative methods for measuring product Characteristics.
4. To enhance the ability of students to work as teams.
5. Improving skills to adopt modern methods in mechanical engineering as continuous improvement
1. The broad education necessary to understand the impact of engineering solutions in a global, economic, environment and societal context.

Course Contents:

UNIT: 1

Assembly and detailed drawings of a mechanical assembly, such as a simple gear box, flange coupling, Knuckle joint, Engine parts etc.

UNIT: 2

Practicing AutoCAD or similar graphics softwares and making orthographic and isometric projections of different components.

Text Books:

1. Machine Drawing by N.D. Bhatt.
2. Machine Drawing by P.S. Gill.

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