SUBJECT		Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title	L	T	P			
HS-3406	Human Values and Ethics (Mandatory)	2	-	-	0	-	-

Human Values, ethics, codes of ethics, integrity, virtues, spirituality, moral development, motivation, customs and religions, society and its role for development, sociological and psychological factors in crime, responsibility and human rights, whistle blowing, intellectual property rights.

Introduction to yoga for professional excellence and stress management.

Global issues : environmental issues, waste management, health hygiene and sanitations, Swachh Bharat Abhiyan, multinational corporations, Business ethics.

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MECHANICAL ENGINEERING, UEC, UJJAIN.

Syllabus for Four Years Bachelor of Technology Degree Course as per NEP-2020

July-2024

SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
MA-3401	Mathematics – III	3 Hours	3	1	0	4 + 0	70	22

Prerequisite : Mathematics–I, Mathematics–II

Course Objective : The goals for the course are to gain a facility with using the transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used. Together with a great variety, the subject also has a great coherence, and the hope is students come to appreciate both. This course also aims to provide an understanding of the basic concepts in probability, conditional probability and independent events. It will also focus on the random variable, mathematical expectation, and different types of distributions, sampling theory and estimation theory. Another objective of the course is to design a statistical hypothesis about the real world problem and to conduct appropriate test for drawing valid inference about the population characteristics. It is inevitable to have the knowledge of hypothesis testing for any research work. The course will provide an opportunity to learn R programming to substantial extent.

Detailed Course Contents

[Total contact hours required: 60 hours]

UNIT - I : ***Laplace Transform (9 lectures, 3 tutorials)*** **[Weightage 14 marks]**

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, Solving ODEs and PDEs by Laplace Transform method.

UNIT - II : ***Partial Differential Equations (9 lectures, 3 tutorials)*** **[Weightage 14 marks]**

First order partial differential equations, Solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Second-order linear PDE equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), Separation of variable method, Wave and Heat conduction equations.

UNIT - III : ***Basic probability and distributions(9 lectures, 3 tutorials)*** **[Weightage 14 marks]**

Probability spaces, Conditional probability, independence; Total probability, Baye's theorem, Discrete random variables, Binomial distribution, Poisson distribution, Continuous random variables and their properties, Normal distribution, Evaluation of statistical parameters for these three distributions.

UNIT - IV : ***Basic Statistics (9 lectures, 3 tutorials)*****[Weightage 14 marks]**

Measures of Central tendency: Moments, Skewness and Kurtosis, Curve fitting by the method of least squares- fitting of straight lines, Second degree parabolas and more general curves. Correlation and Regression, Rank correlation.

UNIT - V : ***Applied Statistics (9 lectures, 3 tutorials)*** **[Weightage 14 marks]**

Tests of significance : Introduction, Sampling and standard error. **Test of significance for large samples :** Null and alternate hypothesis, critical region, critical value, and level of significance, confidence interval, Errors in testing of hypothesis. **Tests of significance for small samples :** Student's *t*-distribution, Snedecor's *F*-distribution. **Chi-Square distribution :** Properties, applications, test for goodness of fit, independence of attributes, test for population variance.

Suggested Test / Reference Books :-

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. R.K. Jain, S.R.K. Iyenger, Advanced Engineering Mathematics, Narosa Publications.
3. W.E. Boyce and R.C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S.L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E.A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E.L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J.W. Brown and R.V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Table-01 : Course Outcomes (COs)

On successful completion of this course students will be able to :

Course Outcome #	Course Outcome
CO1	Find Laplace transform and Inverse Laplace transforms of functions using different methods/ properties and able to apply them to solve initial and boundary value problems.
CO2	Find Integral representation, Fourier transforms and Inverse Fourier transforms of functions using different methods/properties and able to apply them to solve ODEs and PDEs.
CO3	Understand the concepts of probability, random variables and be familiar with some common probability distribution like Binomial, Poisson and Normal distributions and their properties.
CO4	Understand and apply the concepts of Moments, Skewness and Kurtosis, fit different curves by least square method, understand and apply the concepts of correlation and regressions.
CO5	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.

Table-02 : Maping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1	-	-	-	-	-	-	-
CO2	3	3	1	2	1	-	-	-	-	-	-	-
CO3	3	3	1	2	1	-	-	-	-	-	-	-
CO4	3	3	1	2	1	-	-	-	-	-	-	-
CO5	3	3	1	2	1	-	-	-	-	-	-	-
MA	3	3	1	2	1	-	-	-	-	-	-	-

Table-03 : Assessment Poliy

Sr. No.	Particulars	Marks	Policy
1	Mid Semester Exam (MST)	**20**	At least two mid semester tests will be conducted of 20 marks each. The final mid semester marks shall be the average of the two higher mid semester marks.
2	***Quizzes, Assignments, Tutorials and Regularity :***		
	• Quizzes	**04**	Two quizzes will be conducted of 2 (two) marks each
	• Assignments	**04**	Two assignments will be conducted of 2 (two) marks each
	• Tutorials and Regularity	**02**	Every Thursday/Friday a tutorial sheet will be given to the students. Students have to submit, solution of these tutorial sheets on the next Monday. Marks for regularity will be awarded only if the student attend more than or equal to 75%.
3	***End Semester Examinations***	**70**	Question paper for end semester examination will have 05 (five) questions, one from each module (unit). Internal choices will be given.

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
ME-3401	Thermodynamics	3 Hours	3	1	2	4 + 1	70	22

UNIT - I :

Basic Concepts : Thermodynamic systems, thermodynamic properties, processes and equilibrium, quasi-static process, reversible and irreversible process, zeroth law of thermodynamics and concept of measurement of temperature, concept of an ideal gas, heat and work transfer.

First Law of Thermodynamics: First law applied to closed system undergoing a cycle and process, concept of energy, flow process and energy, steady flow process, application of steady flow energy equation (S.F.E.E) in engineering systems, simple non-steady flow processes, limitations of first law of thermodynamics.

UNIT - II :

Second law of Thermodynamics : Kelvin-Planck and Clausius statement, concept of heat engine, refrigerator and heat pump, calculation of thermal efficiency of heat engine cycle and coefficient of performance (C.O.P) of refrigerator and heat pump cycle, equivalence of two statements of second law, Carnot cycle and Carnot's theorem, Clausius theorem, Clausius inequality, concept of entropy and entropy principle, entropy change for ideal gas, available energy, availability and irreversibility.

UNIT - III :

Properties of Pure Substance: Phase, phase-transformations, formation of steam, properties of steam, P-V-T surface of pure substance, T-S diagram, P-V diagram, H-S diagram for a pure substance, quality or dryness fraction of steam, use of steam table and Mollier chart, measurement of steam quality.

Properties of Gases: Deviation of real gas with ideal gas, Avogadro's hypothesis, equation of state of gas, Vander-Waal's equation, evaluation of its constants, limitations of the equation, law of corresponding states, compressibility factor and generalized compressibility chart, P-V-T surface of a real gas.

UNIT - IV :

Thermodynamic Relations : Differential relations for systems of constant chemical composition, combined first and second law of thermodynamics equation, Maxwell relations and their applications, Joule-Kelvin effect and its coefficient.

Gas Mixtures : Properties of mixture of ideal gases, Amagat and Leduc law, internal energy, enthalpy and specific heat of gas mixtures, entropy of gas-mixtures.

UNIT - V :

Gas Power Cycles and its application: Air standard cycles: Otto, Diesel and Dual cycles and their comparison, Fuel-air cycle and actual cycle applied to IC engine, mean effective pressure, calculations for thermal efficiency, valve timing diagram for 4-stroke engine, port timing diagram of 2-stroke engine (SI & CI), Brayton cycle and its modifications.

Recommended Books :-

1. Engineering Thermodynamics by P.K. Nag; Tata McGraw Hill Publication.
2. Thermodynamics – A practical approach by Y.A. Cengel; Tata McGraw Hill Publication.
3. Engineering Thermodynamics by V.Wylen; McGraw Hill Publication.
4. Engineering Thermodynamics by Omkar Singh; New Age International.
5. Engineering Thermodynamics by E. Rathakrishanan; Prentice Hall of India (PHI).

Suggested List of Experiments :-

(1) To study various thermodynamic systems.
(2) To determine the Joule equivalent of heat using Joule's experiment.
(3) To study the nozzle as an application of steady flow energy equation.
(4) To study the two stage reciprocating air compressor using Test Rig as an open system.
(5) To study the construction features of boiler in reference to thermodynamic prospective.
(6) To study the P-V-T surface of pure substance.
(7) To study the determination of Joule-Thomson coefficient using Joule-Thomson apparatus.
(8) To determine the calorific value of fuels by using bomb calorimeter.
(9) To determine the dryness fraction of steam by using throttling calorimeter.
(10) To determine the dryness fraction of steam by using separating and throttling calorimeter.

Course Outcomes (CO's)

After completion of this course the student should be able to :

Course Outcome #	Statement
CO1	Understand various thermodynamic processes and apply the first law of thermodynamics.
CO2	Apply second law of thermodynamics and evaluate entropy, availability and irreversibility.
CO3	Evaluate the phase transformations using P-V-T phase diagrams and the steam tables.
CO4	Compare real and ideal gases and determine properties of mixture of gases.
CO5	Derive thermodynamic relations and analyze different gas power cycles.

Maping of Courses Outcomes (CO's)with Program Outcomes (PO's) and Programe Specific Outcomes (PSO's) :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1
CO1	3	1	1	-	-	-	-	-	1	-	-	1	3	1
CO2	3	3	2	1	-	-	1	-	1	-	-	1	3	2
CO3	3	3	2	2	-	-	-	-	1	-	-	-	3	1
CO4	3	2	-	-	-	-	1	-	1	-	-	1	3	1
CO5	3	3	2	1	-	-	1	-	1	-	-	1	3	2
1 – Low, 2 – Moderate, 3 - High														

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
ME-3402	Theory of Machines	3 Hours	3	1	2	4 + 1	70	22

UNIT - I :

Mechanisms and Machine : Links, kinematics pairs, kinematics chains, degree of freedom and constrained motion, mechanisms, inversions, machines, higher and lower pairs, equivalent linkage, mechanism with lower pairs pantograph, straight-line motion mechanisms, Davis and Ackerman's steering mechanisms, introduction to mechanism synthesis.

UNIT - II :

Motion : Plane motion, absolute and relative motion, displacement, velocity and acceleration of a point, velocity and acceleration in mechanisms - relative velocity method, instantaneous center method, centrodes, Kennedy's theorem, Klein's construction, acceleration diagram, acceleration center, Coriolis components.

UNIT - III :

Belt Drives : Velocity ratio, belt materials, types of belt drive, length of belt, power transmitted by belt, centrifugal effect on belts, maximum power transmitted by belt, initial tension in belt, slip and creep in belt.

Clutches : Single plate and multi plate clutches, cone clutches.

Brakes : Analysis of simple brake assuming uniform pressures and uniform normal wear, band brake, band and block brakes, brakes, internal and external shoe brakes, braking of vehicles.

Dynamometers : Different types and their applications.

UNIT - IV :

Gears : Classification of gears, spur gear terminologies, conjugate action, law of gearing, involute and cycloidal tooth profiles, interference and undercutting, contact ratio, helical, spiral, bevel and worm gears, equivalent spur gear concept, velocity of sliding, center distance, efficiency.

Gear Trains: Simple, compound, epicyclic gear trains, tabulation and formula method, tooth loads and torque calculations in gear trains.

UNIT - V :

Cams : Classification of cams and followers, type of follower motion, uniform, simple harmonic, parabolic, cycloidal, cam profile by graphical method, cams with specified contours.

Gyroscopic Effects : Gyroscopic couple, gyro couple and gyro reaction couple, gyroscopic effect on aero plane, effect of gyroscopic couple on naval ship, stability analysis of four-wheel and two-wheel vehicle, gyro compass.

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

Contd. … 2

Recommended Books :-

1. Theory of Machines and Mechanisms by A. Ghosh and A.K. Mallik, Affiliated East West Press.
2. Theory of Machine and Mechanism by J.E. Shigley and J.J. Uicker; Addison Wesley.
3. Fundamentals of Applied Kinematics by D.C. Tao; Addison Wesley.
4. Theory of Machines by Thomas Bevan; CBS Publisher.
5. Theory of Machines by S.S. Rattan; Tata McGraw Hill.
6. Mechanism and Machine Theory by Dr. A.G. Ambedkar; Prentice Hall of India.

Suggested List of Experiments :-

(1) To study external shoe brake system.
(2) To study disc brake and internal expanding brake.
(3) To find out frictional coefficient of clutch plate.
(4) To study different gears.
(5) To study clutch test rig and to find out torque carrying capacity of clutch plate with different axial thrust.
(6) To verify the relation for gyroscopic couple and study the effect of various parameters.
(7) Study of various types of dynamometers.
(8) To draw the displacement diagram for the CAM and study the jump phenomenon for various pairs of cam and followers.
(9) To perform the creep test.
(10) To study Epicyclic gear train and holding torque apparatus

Course Outcomes (CO's)

After completion of this course the student should be able to :

Course Outcome #	Statement
CO1	Familiarize with common mechanisms, inversion of mechanisms and steering mechanisms.
CO2	Ability to perform complete (translational and rotational) velocity, acceleration analysis of the mechanisms.
CO3	Understand and apply fundamentals of friction, lubrication for clutches, brakes and dynamometers.
CO4	Compare different gears and apply law of gearing, standardization of gears.
CO5	Analyze various motion transmission elements like gear train, various types of cam and follower.

Maping of Courses Outcomes (CO's)with Program Outcomes (PO's) and Programe Specific Outcomes (PSO's) :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1
CO1	3	1	1	-	-	-	-	-	-	-	-	-	-	1
CO2	2	2	2	1	-	-	-	-	-	-	-	-	-	2
CO3	3	3	2	1	-	1	-	-	2	-	-	1	-	3
CO4	3	3	2	2	-	1	-	-	2	-	-	-	-	2
CO5	3	2	3	1	-	1	-	-	2	-	-	1	-	2
1 – Low, 2 – Moderate, 3 - High														

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
ME-3403	Machine Design and Drawing	4 Hours	3	-	2	3 + 1	70	22

UNIT - I :

Drawing conventions, drawing and dimensioning, representation of machine parts such as external and internal threads, slotted heads, square ends, slotted shaft, splined shaft, bearing, spring, gears, surface finish.

UNIT - II :

Basics of riveted and welded joint, design of joints; riveted joints, welded joints, knuckle joints, cotter joints, Basics of limit, fit and tolerance, Limit gauging and gauge design.

UNIT - III :

Assembly Drawing : Detailed and assembly drawings of the following parts :–

- Cotter and Knuckle joints.
- Solid bearing, bushed bearing, pedestal bearing (Plummer block), foot step bearing.
- IC Engine piston, connecting road, crossheads, stuffing box, eccentric.
- Muff coupling, flanged coupling, flexible coupling, universal coupling.
- Lathe tail stock, tool post.

Recommended Books :-

1. Machine drawing by P.S. Gill; Katson Publication, New Delhi.
2. Machine drawing by R.K. Dhawan; S. Chand Publisher, New Delhi.
3. Machine drawing by G.R. Nagpal; Khanna Publisher.
4. Machine drawing by N.D. Bhatt, Charotar; Publishing House.
5. Machine drawing by K.L. Narayan, P. Kannaiah and Venketa Reddy; New Age International Publisher.
6. Machine drawing by N. Sidheshwar, P. Kannaiah and V.V.S. Sastry; McGraw Hill Education (India) Pvt. Ltd. New Delhi.
7. Machine Design by RS Khurmi, JK Gupta, S. Chand publication.
8. Design of machine element, Dr. Sadhu Singh, Khanna publisher

Suggested List of Drawing :-

(1) To draw conventions of different machine component.
(2) To draw Rivet heads and riveted joints.
(3) To draw welded joints.
(4) To draw assembly drawing of Knuckle joint and Cotter joint.
(5) To draw assembly drawing of following bearings :
(i) Solid bearing, (ii) Bushed bearing, (iii) Foot step bearing and (iv) Pedestal bearing.
(6) To draw assembly drawing of following Engine parts :
(i) I.C. Engine Piston, (ii) Connecting rod, (iii) Cross head, (iv) Eccentric and (v) Stuffing box
(7) To draw assembly drawing of following Couplings :
(i) Muff coupling, (ii) Flange coupling, (iii) Universal coupling and (iv) Oldham coupling
(8) To draw assembly drawing of following Lathe parts :
(i) Lathe Tail stock and (ii) Tool post

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

Contd. … 2

Course Outcomes (CO's)

After completion of this course the student should be able to :

Course Outcome #	Statement
CO1	To understand the basics of machine drawing standards, representation and conventions of various machine parts.
CO2	To illustrate various machine parts such as slotted, splined shafts, bearings, springs, gears, threads, rivets, welded joints and understanding limits, fits, tolerances and surface finish.
CO3	To imagine the different parts of given machine and create its different assembled views.
CO4	Apply the basics of Auto-CAD software for drawing the machine parts.
CO5	Create parts and assembly drawings of machine parts using Auto-CAD software.

Maping of Courses Outcomes (CO's)with Program Outcomes (PO's) and Programe Specific Outcomes (PSO's) :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1
CO1	3	-	1	-	-	-	-	-	-	-	-	1	-	2
CO2	2	-	1	-	-	-	-	-	-	-	-	1	2	3
CO3	3	2	-	-	2	-	-	-	-	-	-	1	-	2
CO4	3	1	2	-	3	-	-	-	-	1	-	3	1	2
CO5	2	-	2	1	3	-	-	-	-	-	-	2	1	3
1 – Low, 2 – Moderate, 3 - High														

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
ME-3404	Materials Science and Metallurgy	3 Hours	4	-	2	4 + 1	70	22

UNIT - I :

Introduction : Historical perspective of materials, classification of engineering materials, advanced materials and future materials.

Inter-atomic bonding and crystal structure : Structure of atom, bonding in solids, covalent, ionic bonds, metallic bonds, Vander Waals bonding. Bravais lattices, crystal system arrangement of atoms in BCC, FCC and HCP crystal, atomic packing factor (APF), Miller indices, directional and plane indices, point, line and surface defects, geometry of screw and edge dislocations, Burger vector.

UNIT - II :

Deformation and Strengthening Mechanisms of Metallic Materials : Elastic and plastic deformation**,** deformation of metal by slip and twinning, critical resolved shear stress, deformation in poly-crystalline materials viz. mild steel, cast iron and brass, work hardening, yield point phenomenon and related effects, various strengthening mechanisms, principle of recover, recrystallization and grain growth, cold and hot working of metals and their effect on mechanical properties.

Fracture Behaviour : Fracture in metal and alloys, ductile and brittle fracture, fracture toughness, Griffith's criterion, mechanism of creep and fatigue failure, S-N curve.

UNIT - III :

Phase and Equilibrium Diagrams : Allotropy structure of alloys, various types of phase diagrams, Lever rule, Hume-Rothery's rules, solidification of pure metals and alloys, cooling curves, eutectic systems, eutectoid systems, peritectic and peritectoid systems, iron- iron carbide metastable diagram,development of microstructures in iron–carbon alloys TTT and CCT diagram.

Heat Treatment : Objectives of heat treatment, heat treatment procedure for steel, hardening, hardenability, surface hardening of steel, heat treatment of cast irons and Al and Cu alloys defects in heat treated parts.

UNIT - IV :

Ferrous and Non-Ferrous-Metals and Alloys: Properties and applications of various steels and cast irons, effect of various alloying elements on steel. Non-Ferrous metals base alloys, bronze, brass, duralumin and bearing metals, designations of steels, cast irons and various non-ferrous alloys.

Plastics, Composites and Ceramics: Various types of plastics, their properties and selection, elastomers and their applications, composite materials and ceramics.

UNIT - V :

Powder Metallurgy : Manufacturing of metal powders, sintering and secondary operations, advantages and limitations of powder metallurgy, manufacturing of typical P/M products.

Metallography and Non-Destructive Techniques : Introduction to metallography, sample preparation for micro structural examination and metallurgical Microscope. Visual inspection, dye-penetration, magnetic particle, ultrasonic, radiography test.

Recommended Books :-

1. Material Science and Engineering by William D. Callister; Wiley.
2. Elements of Material Science and Engineering by Lawrence H. Van Vlack; Pearson Education.
3. Introduction to Physical Metallurgy by Sidney H. Avner, McGraw Hill.
4. Mechanical Metallurgy by George E. Dieter; McGraw Hill.
5. The Science and Engineering of Materials by Donald R. Askeland; Cengage India Pvt. Ltd.
6. Material Science by V. Raghvan; Prentice Hall of India.
7. Material Science by G.K. Narula, K.S. Narula, V.K. Gupta; Tata McGraw Hill Pub. Company.
8. Material Science and Metallurgy by O.P. Khanna; Danpat Rai Publications.
9. Non-Destructive Test and Evaluation of Materials by J Prasad & C.G. K Nair; McGraw Hill Pub.

Suggested List of Experiments :-

(1) Metallographic study of given specimen through Metallurgical microscope.
(2) Preparation of specimens for micro examination.
(3) To find out the grain size in single phase and two-phase alloy systems.
(4) To study the different crystal structures.
(5) Study of Fe-Fe_3C Phase Diagram.
(6) Study of effect of Annealing & Normalizing on properties of the steel.
(7) To study the microstructure of carbon steels.
(8) To be familiar with microscopic observation of phases present in cast iron.
(9) To detect the defect in the specimen by using non- destructive test (Magnetic particle Inspection method).
(10) To perform Dye-penetrate test for detection of surface cracks.

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MECHANICAL ENGINEERING, UEC, UJJAIN.

Syllabus for Four Years Bachelor of Technology Degree Course as per NEP-2020

July-2024

SUBJECT		Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title	L	T	P			
ME-3405	CAD Lab	-	-	2	0 + 1	70	22

Introduction of CAD, Drawing commands, practices of modify commands, view commands, editing commands, dimensioning in CAD, drawing practices of elementary machine parts in 2D and 3D.

Recommended Books :-

1. CAD/CAM theory and practice by Ibrahim Zeid and R. Siva Subramanian; Tata McGraw Hill.
2. Mastering CAD/CAM by Ibrahim Zeid; Tata McGraw Hill.
3. CAD/CAM Principles and application by P. N. Rao; Tata McGraw Hill.
4. CAD/CAM/CIM by P. Radhakrishana et. al.; New Age International Publisher.
5. Engineering drawing with Auto-CAD, Agrawal & Agrawal, TMH.
6. Beginning Auto-CAD, Cheryl R. Shrock, Steve Heather.

Suggested List of Drawing :-

(1) To practice on drawing commands.
(2) To practice on editing commands.
(3) To practice on modify commands in Auto CAD.
(4) To draw simple machine parts in 2D.
(5) To draw simple machine parts in 3D.
(6) To draw different machine components and assembled.
(7) To draw simple machine parts and apply dimensions systems.

Course Outcomes (CO's)

After completion of this course the student should be able to :

Course Outcome #	Statement
CO1	Illustrate simple drawing using drawing commands.
CO2	Imagine and Illustrate elementary machine parts in 2D.
CO3	Create elementary machine parts in 3D.
CO4	Modify drawings in CAD using modify commands.
CO5	Create drawing with dimensioning in CAD.

Maping of Courses Outcomes (CO's)with Program Outcomes (PO's) and Programe Specific Outcomes (PSO's) :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO1
CO1	1	-	-	-	3	-	-	-	2	-	-	1	-	1
CO2	1	-	-	-	3	-	-	1	2	1	1	1	-	2
CO3	1	-	-	-	3	-	-	2	3	2	2	2	-	1
CO4	1	1	-	-	3	-	-	2	3	3	2	2	-	2
CO5	1	1	-	-	3	-	-	3	3	2	1	3	-	2
1 – Low, 2 – Moderate, 3 - High														

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

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