NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)

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NIET
Greater Noida
Autonomous Institute

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus
For

Bachelor of Technology

Mechanical Engineering
Second Year
(Effective from the Session: 2024-25)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology

Mechanical Engineering (ME)

EVALUATION SCHEME

SEMESTER-III

S. No.	Subject code	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BOE0362	Engineering Science Courses	Open Elective	3	1	0	30	20	50		100		150	4
2	BME0301	Engineering Mechanics & Strength of Material	Mandatory	3	0	0	30	20	50		100		150	3
3	BME0302	Fluid Mechanics & Machines	Mandatory	3	0	0	30	20	50		100		150	3
4	BME0303	Engineering Thermodynamics	Mandatory	3	1	0	30	20	50		100		150	4
5	BME0304	Manufacturing Science & Technology	Mandatory	3	0	0	30	20	50		100		150	3
6	BME0351	Strength of Materials & Material Characterization Lab	Mandatory	0	0	4				50		50	100	2
7	BME0352	Fluid Mechanics & Machines Lab	Mandatory	0	0	2				25		25	50	1
8	BME0355	Computer Aided Manufacturing	Mandatory	0	0	6				50		100	150	3
9	BME0359	Internship Assessment-I	Mandatory	0	0	2				50			50	1
10	BNC0302/ BNC0301	Environmental Science/ Artificial Intelligence and Cyber Ethics	Compulsory Audit	2	0	0	30	20	50		50		100	NA
		*Massive Open Online Courses (For B.Tech. Hons. Degree)	*MOOCs											
		TOTAL											**1100**	**24**

*** List of Recommended MOOCs (Massive Open Online Courses) for Second Year B. Tech Students (Semester-III)**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0031	Introduction to Python	Infosys Wingspan (Infosys Springboard)	24 h 6 min	1.5
2	BMC0032	Cyber Security Foundation	Infosys Wingspan (Infosys Springboard)	11 h 5 min	0.5

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-II and will be assessed during semester-III**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0301/BNC0302)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The total and obtained marks are not added in the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam. CE: Core Elective,OE:Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
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Elective Subjects

Engineering Science Courses for B.Tech. (AICTE Model Curriculum) 2nd Year

(Effective from the session 2024-25)

Semester-III

Sl.No.	Subject Codes	Subject Name	Types of subject
1	BOE0361	Energy Science & Engineering	Open Elective
2	BOE0362	Material Science	Open Elective
3	BOE0363	Sensor Instrumentation	Open Elective
4	BOE0364	Basics Data Structure & Algorithms	Open Elective
5	BOE0365	Introduction to Soft Computing	Open Elective

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology

Mechanical Engineering (ME)

EVALUATION SCHEME

SEMESTER-IV

S. No.	Subject code	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BAS0401B	Engineering Mathematics-III	Mandatory	3	1	0	30	20	50		100		150	4
2	BASL0401	Technical Communication	Mandatory	2	1	0	30	20	50		50		100	3
3	BME0401	Heat & Mass Transfer	Mandatory	3	0	0	30	20	50		100		150	3
4	BME0402	Computer Integrated Manufacturing	Mandatory	2	0	0	30	20	50		50		100	2
5	BME0403	Measurement and Metrology	Mandatory	3	0	0	30	20	50		100		150	3
6	BME0451	Thermodynamics and Heat & Mass Transfer Lab	Mandatory	0	0	4				50		50	100	2
7	BME0452	Computer Aided Modelling Lab	Mandatory	0	0	4				50		50	100	2
8	BME0455	Machine Design & Application of FEA	Mandatory	0	0	6				50		100	150	3
9	BASL0451	Technical Communication Lab	Mandatory	0	0	2				25		25	50	1
10	BME0459	Mini Project	Mandatory	0	0	2				50			50	1
11	BNC0402/ BNC0401	Environmental Science/ Artificial Intelligence and Cyber Ethics	Compulsory Audit	2	0	0	30	20	50		50		100	NA
		*Massive Open Online Courses (For B.Tech. Hons. Degree)	*MOOCs											
		TOTAL											**1100**	**24**

*** List of Recommended MOOCs (Massive Open Online Courses) for Second Year B. Tech Students (Semester-IV)**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0033	Introduction to AI	Infosys Wingspan (Infosys Springboard)	6h 18m	0.5
2	BMC0034	Finite Elements Analysis	Infosys Wingspan (Infosys Springboard)	9h 52m	0.5

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-IV and will be assessedduring Semester-V**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0401/BNC0402)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The Total and obtained marks are not added in the Grand Total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam. CE: Core Elective,OE:Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
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Elective Subjects

Engineering Science Courses for B.Tech. (AICTE Model Curriculum) 2nd Year

(Effective from the session 2024-25)

Semester-IV

Sl.No.	Subject Codes	Subject Name	Types of subject
1	BOE0461	Energy Science & Engineering	Open Elective
2	BOE0462	Material Science	Open Elective
3	BOE0463	Sensor Instrumentation	Open Elective
4	BOE0464	Basics Data Structure & Algorithms	Open Elective
5	BOE0465	Introduction to Soft Computing	Open Elective

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AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honors only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours = 0.5 Credit
2. For 13 to18 = 1 Credit
3. For 19 to 24 = 1.5 Credit
4. For 25 to 30 = 2 Credit
5. For 31 to 35 = 2.5 Credit
6. For 36 to 41 = 3 Credit
7. For 42 to 47 = 3.5 Credit
8. For 48 and above = 4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honors Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Material Science	**L-T-P [3-1-0]**
Subject Code: BOE0362	**Applicable in Department: ME**

Pre-Requisite of Subject:
Basic Understanding of Chemistry, Physics, and Stress-Strain Response.

Course Objective:
The student cover various aspects of advance engineering materials. Firstly, an investigation into the Phase diagram will be conducted, studying the relationships between phases of materials under different conditions. Next, an exploration of strengthening processes, including heat treatment techniques, will be undertaken to enhance material properties. Additionally, there will be a focus on the study of new materials and their diverse applications. Another area of interest will be the analysis of composite materials and their unique characteristics. Finally, the research will encompass the study of Material characterization and Metallography, providing insights into the structure and properties of materials.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Analyze the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy.	K_3
CO2	Understand and apply heat treatment techniques, TTT diagrams, and diffusion principles for material properties.	K_3
CO3	Understand the features, classification, applications of newer class materials such as smart materials, piezoelectric materials, biomaterials.	K_2
CO4	Understand the fundamentals of composite materials and its applications.	K_2
CO5	Interpret Materials characterization and Metallographic techniques such as X-Ray diffraction, scanning electron microscopy.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Properties of Materials & Phase Diagram	Mechanical Properties, Stress-strain response of metallic, ceramic and polymer materials, yield strength, tensile strength and modulus of elasticity, toughness, plastic deformation, hardenability, fatigue, creep and fracture, Solid solutions, Solubility limit, Gibb's phase rule, binary phase diagrams, intermetallic compounds, iron-carbon phase diagram, cold and hot working of metals, recrystallization, and grain growth. Microstructure, properties, and applications of ferrous and nonferrous alloys.	T1, R2, Marker & Duster/PPT/Animated Videos/ Experiment based learning/ Activity based learning	8	Assignment-1 and Experiment- 4, 5, 6, 11, 12	CO1
2	Heat Treatment and Diffusion	Heat treatment: Various types of heat treatments such as Annealing, Normalizing, Quenching, Tempering (Aus-tempering, Martempering), and various case hardening processes. Time Temperature Transformation (TTT) diagram. Diffusion: Introduction to Diffusion, Types of diffusion, Fick's laws, Factors Affecting Diffusion, Diffusion in Sintering, Doping of semiconductors, Diffusion-based surface treatments.	T1, R2, Marker & Duster/PPT/Animated Videos/ Experiment based learning	8	Assignment-2 and Experiment- 3	CO2
3	Smart and Advanced Materials	Smart materials: classification, piezo electric materials, Rheological materials, chromic materials, thermo-responsive materials magneto strictive materials, Electrostrictive materials, Nanomaterials, Biomaterials and applications, super-alloys, shape memory alloys, exhibiting ferroelectric, opto-electric, semi-conductive, photoconductive, and superconductive properties, and applications.	T1, R2, Marker & Duster/PPT/Animated Videos	8	Assignment-3	CO3
4	Composite Materials	Introduction to Composite, classification of composites, Application of composite, Types of matrix and reinforcements, Fabrication methods of composite materials.	T1, R2, Marker & Duster/PPT/Animated Videos	8	Assignment-4	CO4
5	Material	Materials characterization and Metallographic techniques;	T1, R2, Marker &	8	Assignment-5 and	CO5

	characterization and Metallography	X-Ray diffraction, scanning electron microscopy, transmission electron microscopy, atomic force microscopy, scanning tunnelling microscopy, atomic absorption spectroscopy, and differential scanning calorimetry. Introduction to various NDT Techniques.	Duster/PPT/Animated Videos/ Experiment based learning		Experiment-1, 2	
				Total	**40**	

Textbooks	
S. No.	**Book Details**
1.	William D., Jr. Callister and David G. Rethwisch, "Materials Science and Engineering: An Introduction". Wiley and Sons; 8th edition (December 30, 2009); Language: English. ISBN-10: 0470419970.
2.	R. K. Rajput, "A Textbook of Material Science". S.K. Kataria& Sons, 2013, ISBN 13: 9789350144183
3.	F. Shackelford, "Introduction to Material Science for Engineers". Pearson Education, 2014, ISBN 13: 9780133826654
4.	P N Rao, Manufacturing Technology – Foundry, Forming, and Welding, 4th edition, McGraw Hill Education (India) Private Limited.
5.	Manufacturing science by A. Ghosh and AK Mallik Eat and west publishing house

Reference Books	
S. No.	**Book Details**
1.	Tariq A. Khraishi and Marwan S. Al-Haik, "Experiments in Materials Science and Engineering
2.	V. Raghavan, "Materials Science and Engineering: A First Course". PHI Learning, ISBN 13: 9788120350922
3.	B. L. Juneja Sekhon, Fundamentals of Metal Cutting and Machine Tools, New Age Intl.

Links	
Unit 1:	NPTEL :: Metallurgy and Material Science - NOC:Introduction to Materials Science and Engineering
Unit 2:	NPTEL :: Metallurgy and Material Science - NOC:Heat Treatment and Surface Hardening - I NPTEL :: Metallurgy and Material Science - Phase Transformations and Heat Treatment
Unit 3:	NPTEL :: Metallurgy and Material Science - NOC:Advanced Materials and Processes NPTEL :: Mechanical Engineering - NOC:Smart Materials and Intelligent System Design
Unit 4:	NPTEL :: Mechanical Engineering - NOC:Introduction To Composites NPTEL :: Mechanical Engineering - NOC:Manufacturing of Composites
Unit 5:	NPTEL :: Metallurgy and Material Science - NOC:Material Characterization

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Mechanical Engineering

Subject Name: Engineering Mathematics-III	**L-T-P [3-1-0]**
Subject Code: BAS0301B	**Applicable in Department: ME**

Pre-requisite of Subject:
Knowledge of Mathematics I and II of B. Tech or equivalent.

Course Objective:
Concept of function of complex variables, Partial differential equations & their applications, Numerical techniques for various mathematical tasks and numerical aptitude. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO 1	Apply the concept of partial differential equation to solve partial differential Equations and problems concerned with partial differential equations	K_3
CO 2	Apply the concept of fourier transform and Z-transform to solve difference equations.	K_3
CO3	Apply the working methods of complex functions for finding analytic functions.	K_3
CO 4	Apply the concepts of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals	K_3
CO 5	Solve the problems of Number System, Permutation & Combination, Probability, Set theory, Function, Data Interpretation, Syllogism.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	**Partial Differential Equation and its Applications**	Introduction of partial differential equations, Second order linear partial differential equations with constant coefficients. Classification of second order partial differential equations, Method of separation of variables for solving partial differential	Classroom Teaching, Smart Board, PPT, M-tutor.	8	**Assignment 1.1**	CO1

		equations, Solution of one-dimensional wave and heat equations				
2	**Integral Transforms**	Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one-dimensional heat transfer equations and wave equations, Z-transform and its application to solve difference equations.	Classroom Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-2.1**	CO2
3	**Complex Variable – Differentiation**	Limit, Continuity and differentiability, Functions of complex variable, Analytic functions, Cauchy- Riemann equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions, Mobius transformation and their properties.	Classroom Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-3.1**	CO3
4	**Complex Variable – Integration**	Complex integrals, Contour integrals, Cauchy-Goursat theorem (Statement), Cauchy integral formula (Statement), Taylor's series, Laurent's series, Liouvilles's theorem(Statement), Singularities, Classification of Singularities, zeros of analytic functions, Residues, Methods of finding residues, Cauchy Residue theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(sin\theta, cos\theta)$ and $\int_{-\infty}^{\infty} f(x)dx$.	Classroom Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-4.1**	CO4
5	**Aptitude-III**	Number System, Permutation & Combination, Probability, Set theory, Function, Non Verbal Reasoning. Data Interpretation, Syllogism.	Classroom Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-5.1**	CO5
			Total	**40**		

Textbooks

S. No.	Book Details
1.	B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
2.	B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3.	R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House 2002.
4.	E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.

Reference Books	
S. No.	**Book Details**
1.	Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
2.	Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.

Links

Unit 1: NPTEL :: Mathematics - NOC:Partial Differential Equations
Unit 2: NPTEL :: Mathematics - NOC:Integral Transforms And Their Applications
Unit 3: NPTEL :: Mathematics - Complex Analysis
Unit 4: NPTEL :: Mathematics - Complex Analysis
Unit 5: NPTEL: Discrete Mathematics, IIT Roorkee
NPTEL :: Multidisciplinary - NOC:Research Methodology
NPTEL :: Mathematics - NOC: Introduction to Probability Theory and Stochastic Processes

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Engineering Mechanics & Strength of Material	**L-T-P [3-0-0]**
Subject Code: BME0301	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic understanding of Physics and Mathematics.

Course Objective:
The course aims to provide students with a comprehensive understanding of the mechanical properties of materials, their response to external forces, and their behavior under different types of loads. It focuses on analyzing and designing structural components by calculating stresses, deformations, and internal forces. Students learn to select appropriate materials based on their properties and design structures with an emphasis on safety and preventing failures. The course encourages the application of theoretical concepts to practical engineering problems, equipping students with the knowledge and skills necessary for successful careers in the field.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Understand the concept of force systems and apply the force equilibrium condition to various two-dimensional problems.	K_2
CO2	Analyze centroid and moment of inertia and apply concept of stress and strain under different loading conditions.	K_3
CO3	Analyze the beams and determine stresses, slope and deflection of the beams.	K_4
CO4	Understand the basic concept and analysis of shaft subjected to torsion and apply the concepts of stresses and strain in solving problems buckling of columns.	K_3
CO5	Apply the concepts of stresses and strain in solving problems related to thin and thick cylinders.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required	Practical/ Assignment/ Lab Nos	CO Mapping

				(L+P)		
1	Force System and Truss analysis	Overview of force system, review of two-dimensional force systems, free body diagram, equilibrium of force systems, laws of friction, equilibrium analysis of simple systems involving friction. Trusses: Introduction, simple truss and solution of simple truss, methods of joints and methods of sections.	Video, PPT, digital screen, Board Marker	10	Assignment-1 and Experiment-4,5,6	CO1
2	Centroid, Moment of Inertia and Compound stress & strains	Centroid of plane, curve, area, volume and composite bodies, moment of inertia of plane area, parallel axis theorem, perpendicular axis theorem, concept and importance of principal moment of inertia. Introduction, normal stress and strain, shear stress and strain, stress on inclines sections, principal stress and strain, maximum shear stress, Mohr's circle methods, strain energy, impact loads and stresses, thermal Stresses.	Video, PPT, digital screen, Board Marker	10	Assignment-2 and Experiment-6,7	CO2
3	Beam and Bending of Beams	Introduction to beam, shear force and bending moment, different equations of equilibrium, shear force and bending moment diagram for statically determinate beams. Bending of beams, theory of Pure Bending, normal stresses in beams, shear stresses in beams due to transverse and axial loads, composite beams. Deflection of beams, differential equation of the elastic curve, cantilever and simply supported beams, Macaulay's method, area moment method, fixed and continuous beams.	Video, PPT, digital screen, Board Marker	10	Assignment-3 and Experiment-8	CO3
4	Torsion and Stability of Columns	Introduction to torsion, combined bending and torsion of solid and hollow shafts. Buckling and stability, slenderness ratio, combined bending and direct stress, middle third and middle quarter rules, struts with different end conditions, Euler's theory for pin-ended columns, effect of end conditions on column buckling, Rankine Gordon formulae.	Video, PPT, digital screen, Board Marker	10	Assignment-4 and Experiment-9,10	CO4

5	Cylinders & Spheres	Introduction to thin cylinders, difference between thin-walled and thick-walled pressure vessels, thin-walled spheres and cylinders, hoop and axial stresses and strain, and volumetric strain. Introduction to thick cylinders, radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures.	Video, PPT, digital screen, Board Marker	10	Assignment-5	CO5
			Total	**50**		

Textbooks	
S. No.	**Book Details**
1.	Engineering Mechanics by S.S. Bhavikatti, New Age Intl. Publications
2.	Strength of Materials by R. S. Khurmi, S. Chand and Company Ltd.
3.	Strength of Materials by R. K. Rajput, S. Chand and Company Limited.
4.	Strength of Materials by R. K. Bansal, Laxmi Publication.
5.	Introduction to Solid Mechanics by Shames, Pearson

Reference Books	
S. No.	**Book Details**
1.	Engineering Mechanics by A Nelson, TMH Publication.
2.	Mechanics of Materials by Hibbeler, Pearson.
3.	Mechanics of Material by Gere, Cengage Learning
4.	Mechanics of Materials by Beer, Johnston, DE wolf and Mazurek, Mc Graw Hill India
5.	Strength of Materials by Pytel and Singer, Harper Collins
6.	Strength of Materials by Ryder, Macmillan.
7.	Strength of Materials by Timoshenko and Young, East West Press.

Links

1. NPTEL :: Mechanical Engineering - NOC:Engineering Mechanics
2. NPTEL :: Mechanical Engineering - NOC:Engineering Mechanics Statics and Dynamics
3. Strength Of Materials - IITM - Course (nptel.ac.in)
4. NPTEL Strength of Materials, IIT Roorkee

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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Subject Name: Fluid Mechanics & Machines	**L-T-P [3-0-0]**
Subject Code: BME0302	**Applicable in Department: ME**

Pre-requisite of Subject:
Engineering Mathematics, Engineering Mechanics

Course Objective:
The objective of the Fluid Mechanics & Machines course is to provide students with a comprehensive understanding of fluid properties, fluid statics, and fluid dynamics principles. Students will learn to analyze and solve problems related to fluid flow in pipes, and around submerged bodies. The course will cover the principles and applications of fluid machinery, including pumps, turbines, and compressors. Through theoretical concepts and practical laboratory experiments, students will develop the skills to design, and analyze, fluid systems and machinery, preparing them for advanced studies and careers in mechanical engineering field.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Understand fluid properties, laws, and applications in measurements, buoyancy, Bernoulli's equation, and hydrostatic force analysis.	K_2
CO2	Analyze continuum and free molecular flows, including various flow types, equations, dimensionless numbers, and aerodynamic concepts.	K_4
CO3	Apply the fluid flow through pipes, turbulence characteristics, boundary layer dynamics, and application of momentum equations.	K_3
CO4	Understand and apply momentum equations, hydrodynamic thrust, turbine classifications, velocity triangles, power/efficiency calculations, and turbine selection principles.	K_3
CO5	Understand classifications, efficiencies, performance, and characteristics of centrifugal and reciprocating pumps, compressors, and related systems.	K_2

Syllabus

Unit No.	**Module Name**	**Topic covered**	**Pedagogy**	**Lecture Required**	**Practical/ Assignment/**	**CO Mapping**

				(L+P)	**Lab Nos**	
1	Fluid Properties	Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension, Capillarity effect, Pressure Scale, manometers, buoyancy, Bernoulli's equation, and its applications - Pitot tube, orifice meter, venturi meter and bend meter, Magnus effect, notches and weirs, Hydrostatic force analysis.	Video, PPT, digital screen, Board Marker	8	Assignment-1 and Experiment-1, 2, 3, 4	CO1
2	Fluid Flow Analysis	Continuum & free molecular flows; Steady and unsteady, uniform, and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two- and three-dimensional flows, streamlines, path lines, streak lines and flow net, continuity equation and applications (3D), circulation and vorticity, stream function and velocity potential function. Drag and lift, aero foil, Buckingham Pi theorem, important dimensionless numbers, and their significance.	Video, PPT, digital screen, Board Marker	8	Assignment-2	CO2
3	Pipe Flow and Boundary Layer Analysis	Equation of motion for laminar flow through pipes, turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks. Boundary layer thickness, boundary layer over a flat plate, laminar boundary	Video, PPT, digital screen, Board Marker	8	Assignment-1 and Experiment-5, 6	CO3

		layer, application of momentum equation, turbulent boundary layer, laminar sub layer, separation and its control.				
4	Prime Movers and Thrust Analysis	Momentum equation and its applications, Introduction to hydrodynamic thrust of jet on a fixed, moving surface, hinged surface and series of vanes, Classification of turbines, Impulse turbines, Constructional details, Velocity triangles, Power and efficiency calculations, Governing of Pelton wheel. Francis and Kaplan turbines, Constructional details, Velocity triangles, Power and efficiency Principles of similarity, Unit and specific speed, Performance characteristics, Selection of water turbines.	Video, PPT, digital screen, Board Marker	8	Assignment-4 and Experiment-7, 8	CO4
5	Fluid Pumps and Devices	Classifications of centrifugal pumps, Vector diagram, Work done by impellor, Efficiencies of centrifugal pumps, Specific speed, Cavitation & separation, Performance characteristics. Reciprocating pump theory, Slip, Indicator diagram, Effect of acceleration, air vessels, Comparison of centrifugal and reciprocating pumps, Performance characteristics, Hydraulic lifts, torque convertor, Air jet pump, Vacuum pumps, Pressure regulators, Introduction to Compressors	Video, PPT, digital screen, Board Marker	8	Assignment-5 and Experiment-9	CO5
			Total	**40**		

Textbooks

S. No.	Book Details
1.	F. M. White, Fluid Mechanics, 6th Ed., Tata McGraw-Hill, 2008.
2.	Fluid Mechanics and Its Applications by V.K. Gupta et.al
3.	Batchelor, G. K. (1999). Introduction to fluid dynamics. New Delhi, India: Cambridge University Press.
4.	Acheson, D. J. (1990). Elementary fluid dynamics. New York, USA: Oxford University Press.
5.	R.W. Fox, A.T. McDonald and P.J. Pritchard, Introduction to Fluid Mechanics, 6th Ed., John Wiley, 2004.

Reference Books	
S. No.	**Book Details**
1.	Fluid mechanics and machines by R.K Bansal.
2.	Fluid mechanics by R. K. Rajput, S. Chand and Company Limited.
3.	Fluid Mechanics by Yunus Cengel.
4.	Introduction to fluid mechanics and Fluid machines by S.K. Som, Gautam Biswas, S Chakraborty

Links

1. NPTEL :: Mechanical Engineering - NOC:Introduction to Fluid Mechanics
2. NPTEL :: Mechanical Engineering - NOC:Fluid Machines

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Engineering Thermodynamics	**L-T-P [3-1-0]**
Subject Code: BME0303	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic Knowledge of Physics and Mathematics.

Course Objective:
The objective of this course is to provide students with a comprehensive understanding of the principles and laws of thermodynamics and their applications in engineering. Students will learn to analyze and solve problems related to energy conversion, heat transfer, and thermodynamic cycles. The course covers fundamental concepts such as the first and second laws of thermodynamics, properties of pure substances, and the behavior of gases and vapors. Students will also explore real-world applications, including power generation. Through theoretical and practical approaches, students will understand the thermodynamic systems in various engineering contexts.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Understand energy balance to systems in situation involving heat and work interactions and its application on energy conversion devices.	K_2
CO2	Analyze and apply 2nd law of thermodynamics and principle of entropy to various engineering problems.	K_3
CO3	Evaluate the properties of pure substances and analyze the power generation using steam-based cycles. able to understand the working of boilers and condensers.	K_3
CO4	Understand the working of boilers and condensers and analyze the power generation using gas-based cycle.	K_3
CO5	Analyze the flow of fluids through nozzles and turbines.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping

1	Zeroth and First Law of Thermodynamics	Introduction: Basic Concepts: Concept of System and Surrounding, State, Property, Process, Cycle, Reversibility, Quasi–static Process, Thermodynamic Equilibrium. Zeroth law of thermodynamics: Concept of equality of Temperature and, Temperature measurement. First law of thermodynamics: Concept of Heat and Work, types of work, Sign Convention. Joules' experiment, First law analysis for open and closed system, Limitations of first law of thermodynamics, PMM-I. SFEE and its applications.	T1, T3, R2, Smart board /PPT/Animated Videos	8	Assignment-1	**CO1**
2	Second Law of Thermodynamics and Entropy	Second law of thermodynamics: Concept of Heat engines, Heat pump and Refrigerator, Kelvin Planck and Clausius statement of second law of thermodynamics, Carnot cycle, Carnot theorem and it's corollaries, PMM-II. Entropy: Clausius inequality, Concept of Entropy, Entropy change of pure substance in different thermodynamic processes, Tds equation, Principle of entropy increase, Statement of the third law of thermodynamics.	T1, T3, R2, Smartboard /PPT/ Animated Videos	8	Assignment-2	**CO2**
3	Pure Substance and Vapour Power Cycle	Properties of steam and Rankine cycle: Property of Pure Substance(steam), Saturation states, Sub-cooled liquid state, Superheated vapour state, Phase transformation process of water, Steam-Tables & Mollier chart. Vapour Power cycles: Rankine cycle with superheat, reheat and regeneration. Modification in Rankine cycles for efficiency improvements	T1, T3, R2, Smartboard /PPT/ Animated Videos	8	Assignment-3	**CO3**
4	Boiler, Condenser and Gas Power Cycle	Boilers: Classifications and working of boilers, boilers mountings and accessories, Boiler efficiency, Equivalent evaporation. Condenser: Classification of condenser, air leakage.	T1, T3, R2, Smartboard /PPT/ Animated Videos	8	Assignment-4	**CO4**

		Gas power cycles: Brayton cycle, Gas turbine cycles with intercooling, reheat and regeneration and their combination.				
5	Nozzles and Steam Turbines	Steam and Gas Nozzles: Flow through Convergent and convergent-divergent nozzles, variation of velocity, area, and specific volume, choked flow, throat area, Nozzle efficiency, Effect of friction on nozzle. Steam Turbines: Classification of steam turbine, Velocity diagram of impulse turbines, Velocity diagram of reaction turbines, Losses in steam turbines, Governing of turbines.	T1, T3, R2, Smartboard /PPT/ Animated Videos	8	Assignment-5	**CO5**
Total				**40**		

Textbooks	
S. No.	**Book Details**
1.	Engineering Thermodynamics – P.K. Nag, Tata McGraw-Hill Education, 2005
2.	Power Plant Engineering–P.K. Nag, Tata McGraw-Hill Education.
3.	Thermodynamics: An Engineering Approach by Michael A. Boles and Yunus A Çengel

Reference Books	
S. No.	**Book Details**
1.	Fundamentals of Thermodynamics -- Sonntag R.E., Borgnakke C. & Van Wylen C.J.
2.	Fundamentals of Engineering Thermodynamics -- Moran M. J. & Shapiro H.N
3.	Thermodynamics: Fundamentals for Applications – J P O'connell& J MJaile
4.	Fundamentals of Engineering Thermodynamics -- Howell J.R.

Links

1. NPTEL Engineering Thermodynamics, IIT Kanpur
2. NPTEL Applied Thermodynamics, IIT Madras
3. NPTEL Power Plant Engineering, IIT Roorkee

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Manufacturing Science & Technology	**L-T-P [3-0-0]**
Subject Code: BME0304	**Applicable in Department: ME**

Pre-requisite of Subject:
Digital Manufacturing

Course Objective:
Classify manufacturing processes; understand the significance and steps involved in metal casting processes, Design, analyze gating systems for casting and explain different special casting processes, Understand and apply principles concerned with metal forming processes , identify, evaluate different sheet metal forming operations, sheet metal dies, arc welding processes and welding defects, Working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, The concept of abrasive machining process such as grinding and allied machines and broaching , The basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming, The basic concepts of Non-Traditional Manufacturing Methods.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Understand the concept of manufacturing processes, solve the problems based on casting.	K_3
CO2	Analyze & solve the problems based on Metal forming processes & understand the concept of powder metallurgy.	K_4
CO3	Understand the concept of metal joining processes.	K_2
CO4	Analyze the conventional machining processes.	K_3
CO5	To analyze the non-traditional machining process & the Abrasive finishing processes.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Casting & Special	Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top	Video, PPT, digital screen,	8	Assignment-1 and Experiment-	CO1

	Casting Processes	Gating, Bottom Gating and Relation (condition) to Avoid Aspiration Effect Design of Risers: Types of Risers, Directional Solidification, Chvorinov's Rule and Caine's method. Special Casting Processes: CO_2 Moulding, Shell Moulding, Investment Casting, Die Casting, Hot and Cold Chamber Processes; Centrifugal casting; Continuous Casting Defects – Types, Causes and Remedies.	Board Marker		1.1, 1.2, 1.3, 1.4	
2	Metal Forming Processes & Sheet Metal Forming	Forging: Analysis of forging process. Rolling: Types of Rolling mills and Defects in Rolling. Flat Rolling and Terminology. Analysis of rolling process Extrusion: Direct and Indirect Extrusion, Impact Extrusion, Hydrostatic Extrusion, analysis of extrusion process, Defects in Extruded Products. Drawing: Wire drawing, Rod and Tube Drawing. Sheet Metal Forming: Classification of press tool operations; Punch and Die Clearances, Ironing, Coining and Embossing, Lancing, Twisting, Spinning, Stretch forming. Sheet Metal Drawing: Drawing, Cupping and Deep drawing Draw Die Design. Defects in drawing. Sheet Metal Dies: Progressive, Compound and Combination Dies. Bending and Bending Allowance, Rubber Forming.	Video, PPT, digital screen, Board Marker	10	Assignment-2 and Experiment-2.1, 2.2, 2.3, 2.4, 2.5, 2.6	CO2
3	Metal Joining Processes	Electric Arc Welding: Introduction, Characteristic curves of constant-current and constant voltage, arc welding transformer; Electrodes – consumable and non-consumable electrodes, Functions of coatings on the electrodes, Arc blow. Arc Welding Processes – Shielded metal arc welding (SMAW), Inert Gas Arc Welding – Tungsten Inert Gas (TIG) welding and Metal Inert Gas (MIG) arc welding, Submerged arc welding (SAW), Resistance welding: Principle and types of resistance welding. Metallurgy of Arc welding: Principal zones in the joint and typical grain structure, Welding defects. Terminology. Welding Symbols, WPS (Welding Procedure Specifications), PQR (Procedure Qualification Record).	Video, PPT, digital screen, Board Marker	8	Assignment-3 and Experiment-8.1, 8.2, 8.3	CO3
4	Mechanics of Metal Cutting	Tool Engineering: Cutting Tool geometry and definition of principles tool angles of single point cutting tools, Mechanics of Metal Cutting: Features of machining processes, mechanism of chip formation, chip	Video, PPT, digital screen, Board Marker	8	Assignment-4 and Experiment-8.6, 8.7	CO4

		reduction coefficient, force analysis, Merchants circle of cutting forces, expression for shear plane angle and coefficient of friction in terms of cutting forces and tool angles, Merchants theory-original and modified, effect of various parameters on cutting forces, Different types of dynamometers and their operations, Tool life definition, mechanism of tool wear and measurement, preliminary and ultimate feature, factors influencing tool life such as speed, feed, depth of cut, tool material, cutting fluids etc., Machinability, factors affecting surface finish.				
5	Un-Conventional Machining	Introduction and Classification of Un-Conventional Machining, Analysis of Un-Conventional Machining: ECM, EDM, USM, LBM and Water and Abrasive Jet Machining.	Video, PPT, digital screen, Board Marker	8	Assignment-5 and Experiment-9.1, 9.2	CO5
			Total	**42**		

Textbooks	
S. No.	**Book Details**
1.	A Textbook of Manufacturing Technology: Manufacturing Processes by R. K. Rajput
2.	A Textbook of Production Technology by P C Sharma
3.	Manufacturing Technology: Theory and Problems D. K. Singh
4.	Manufacturing Technology - I by Anup Goel

Reference Books	
S. No.	**Book Details**
1.	Manufacturing Technology: Materials, Processes, and Equipment by Helmi A. Youssef, Hassan A. El-Hofy, Mahmoud H. Ahmed
2.	Advanced Manufacturing Technologies by Stephen F. Krar, Arthur Gill ·
3.	Manufacturing Technology II by Dr. R. Kesavan, B. Vijaya Ramnath
4.	Manufacturing Science by Ghosh, A. K. Mallik

Links

1. NPTEL :: Mechanical Engineering - NOC:Fundamentals of manufacturing processes
2. Manufacturing Process Technology I & II - Course (nptel.ac.in)
3. NPTEL :: Mechanical Engineering - NOC:Fundamental of Welding Science and Technology
4. NPTEL :: Mechanical Engineering - NOC:Mechanics of Machining
5. NPTEL :: Mechanical Engineering - Advanced Machining Processes
6. NPTEL :: Mechanical Engineering - NOC:Non Traditional Abrasive Machining Processes- Ultrasonic, Abrasive Jet and Abrasive Water Jet Machining

NIET Greater Noida	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Strength of Materials & Material Characterization Lab	**L-T-P [0-0-4]**
Subject Code: BME0351	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic Knowledge of Physics, Chemistry and Mathematics.

Course Objective:
The course aims to provide students with practical experience that complements the theoretical aspects of the course by providing with hands-on experience. It allows them to validate theoretical concepts, apply their knowledge to real-world scenarios, develop proficiency in instrumentation and measurements, analyse experimental data, and enhance their technical reporting and communication skills. Ultimately, the practical/lab component prepares students for practical engineering applications and equips them with the necessary skills for success in the field of strength of materials.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Perform the microstructural study of different materials.	K_2
CO2	Observe the effect of heat treatment effect on mechanical properties of metallic specimens.	K_2
CO3	Determine the tensile, compressive, shear, flexural, torsional and fatigue strength of metallic.	K_2
CO4	Determine the different types of hardness of metallic specimens.	K_2
CO5	Observe the effect of impact and corrosion behaviour on metallic specimen.	K_2

List of Practical's

S. No.	**Details of Practical**	**CO Mapping**
1	To study the microstructures of a prepared specimen using optical microscope.	CO1
2	Comparative study of microstructures of different specimens of different materials	CO1

	(Mild Steel, Gray C.I., Brass, Copper, Aluminium).	
3	To Study heat treatment processes such as annealing, normalizing, quenching, and comparison of properties before and after heat treatment.	CO2
4	To determine the tensile strength of metallic specimen on universal testing machine.	CO3
5	To determine the tensile strength of polymer specimen on Electronic Tensometer.	CO3
6	To determine the compressive strength of metallic specimen on universal testing machine.	CO3
7	To determine the shear strength of metallic specimen on universal testing machine.	CO3
8	To determine the flexural strength (3-point bending) of metallic specimen on universal testing machine.	CO3
9	To determine of torsional strength of a metallic specimen using the torsion testing machine.	CO3
10	To determine of fatigue strength of a metallic specimen on Fatigue Testing Machine.	CO3
11	To determine the Brinell hardness of materials on Hardness Tester.	CO4
12	To determine the Rockwell hardness of materials on Hardness Tester.	CO4
13	To Determine the impact strength (Charpy Method) of a metallic specimen on Impact Testing Machine.	CO5
14	To Determine the impact strength (Izod Method) of a metallic specimen on Impact Testing Machine.	CO5
15	To study the corrosion and its effects on metallic specimen.	CO5
Required Software and Tools		
UTM, Tensometer, Hardness Tester, Microscope, Fatigue Testing Machine, Torsion Testing		

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Subject Name: Fluid Mechanics & Machines Lab	**L-T-P [0-0-2]**
Subject Code: BME0352	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic Knowledge of Physics and Mathematics.

Course Objective:
The course aims to provide students with practical experience that complements the theoretical aspects of the course by providing with hands-on experience. It allows them to validate theoretical concepts, apply their knowledge to real-world scenarios, develop proficiency in instrumentation and measurements, analyse experimental data, and enhance their technical reporting and communication skills. Ultimately, the practical/lab component prepares students for practical engineering applications and equips them with the necessary skills for success in the field of strength of materials.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Demonstrate performance characteristics of flow and flow measuring devices.	K_2
CO2	Demonstrate various turbines and determine their efficiency.	K_2
CO3	Demonstrate various pumps and determine their efficiency.	K_2
CO4	Demonstrate various compressor and determine their efficiency.	K_2
CO5	Demonstrate hydraulic ram and determine its efficiency.	K_2

List of Practical's

S. No.	**Details of Practical**	**CO Mapping**
1	To verify the Bernoulli's Theorem.	CO1
2	To determine the coefficient of discharge of venturi meter.	CO1
3	To determine coefficient of discharge of an orifice meter.	CO1
4	To determine the coefficient of discharge of Notch (V and Rectangular types).	CO1

5	To determine the minor losses due to sudden enlargement, sudden contraction, and bends.	CO1
6	To determine the coefficient of discharge, contraction & velocity of an orifice.	CO1
7	To find critical Reynolds number for a pipe flow.	CO1
8	To determine the coefficient of impact for vanes.	CO2
9	Experiments on performance of Pelton wheel	CO2
10	To study of various Reaction turbines.	CO2
11	Experiments on performance of Francis turbine	CO2
12	Experiments on performance of Centrifugal Pump	CO3
13	Experiments on performance of reciprocating pump	CO3
14	To study of Gear pump.	CO3
15	To demonstrate centrifugal compressor and find the efficiency.	CO4
16	To demonstrate hydraulic ram and find the efficiency.	CO5
Required Software and Tools		
Pelton Turbine, Francis Turbine, Reciprocating pump		

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Computer Aided Manufacturing (Workshop Mode)		**L-T-P [-0-0-6]**
Subject Code: BME0355		**Applicable in Department: ME**
Pre-requisite of Subject: Basics of CAD & Digital Manufacturing		
Course Objective: The course aims to elucidate conventional and modern manufacturing processes and to make components by using different manufacturing processes.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Demonstrate different Casting and forming operation and make components.	K_2
CO2	Demonstrate traditional and computer-controlled machining process to make a component as per the drawing.	K_2
CO3	Demonstrate welding process and make a component as per the drawing.	K_2
CO4	Demonstrate different types of surface finishing processes.	K_2
CO5	Demonstrate modern manufacturing processes and make a component as per drawing.	K_2

List of Practical's

S. No.	Details of Practical	CO Mapping
1.1	Pattern Making by wood working lathe	CO1
1.2	Gatting System: - Mould making, Position of riser, runner,	CO1
1.3	Casting: - Melting of metal in furnace, pouring of molten metal	CO1
1.4	Identification of different casting defects	CO1
2.1	Flattening: Use a mallet or a hammer to flatten a sheet metal surface that has become warped or distorted.	CO1

2.2	Make a nail using forging process.	CO1
2.3	Make a ring using forging process.	CO1
2.4	Curling: Use a curling tool or pliers to curl the edge of a sheet metal strip or panel.	CO1
2.5	Embossing: Use embossing dies or stamps to create raised designs or patterns on a sheet metal surface.	CO1
2.6	Stamping: Use metal stamps and a hammer to stamp letters, numbers, or designs onto a sheet metal surface.	CO1
2.7	Piercing: Use a hole punch or drill to create holes of various sizes and shapes in a sheet metal panel.	CO1
2.8	Examine the influence of heat treatment on the mechanical properties of cold-formed components.	CO1
3.1	Analyze the impact of varying blank holding forces on the formability of deep-drawn sheet metal components.	CO1
3.2	Study the effect of different lubrication methods on the quality of stretch-formed sheet metal parts.	CO1
3.3	Investigate the influence of process parameters on the dimensional accuracy in incremental sheet forming.	CO1
3.4	Examine the effect of different tool geometries on the wrinkling behavior in sheet metal hydroforming.	CO1
3.5	Edge Forming: Use pliers or a forming tool to create various edge shapes, such as flared, curled, or chamfered edges.	CO1
3.6	Planishing: Use a planishing hammer or a hammer and dolly to smooth out imperfections or surface irregularities on a sheet metal panel.	CO1
3.7	To make a component using Injection Mounding.	CO1
4.1	To Perform Plane Turning, Taper Turning, Threading, Grooving, Knurling Chamfering and make a component.	CO2
5.1	Make a hole at different locations using radial drill machine.	CO2
6.1	Cut gear teeth on horizontal milling machine through plane indexing method.	CO2
6.2	Cut a keyway on vertical milling machine.	CO2
7.1	To write a part program for Perform Plane facing, Turning, Taper Turning and Threading operations and make a component	CO2
7.2	V-Carving: Use a CNC Router with a V-bit to create decorative V-shaped grooves or carvings on a material.	CO2
7.3	Engraving: Use a CNC router to engrave text or designs onto a surface, such as wood or acrylic.	CO2
7.4	Pocketing: Use a CNC machine to create pockets or recesses in a material, suitable for fitting objects like screws or nuts.	CO2
7.5	Drilling: Use a CNC machine to drill precise holes in a material at specific locations and depths.	CO2
8.1	To make a Butt, Lap, T Joint by using gas and ARC welding Process	CO3

8.2	To make a component by using spot welding	CO3
8.3	To make a component by using TIG and MIG welding	CO3
8.4	Polishing: Use abrasive compounds or polishing wheels to achieve a smooth and reflective surface finish on a workpiece.	CO4
8.5	To make a single point cutting tool on tool grinder.	CO4
8.6	Study of the effect of grinding wheel conditioning techniques (e.g., dressing, truing) on grinding performance and wheel life.	CO4
8.7	Material Removal Rate Analysis: Determine the material removal rate achieved by different abrasive machining processes under various parameters.	CO4
9.1	LASER Machining: - make a hole in non-conducting materials	CO5
9.2	ECM Taper Cutting: Explore the capabilities of ECM for cutting tapered features or workpieces with angled profiles.	CO5
10.1	Keychain or Key Holder: Design and print a personalized keychain or key holder to showcase the capabilities of 3D printing	CO5
10.2	Phone Stand: Print a phone stand to hold your smartphone in a convenient viewing position	CO5
10.3	Plant Pot: Print a small plant pot to hold a succulent or small indoor plant.	CO5
10.4	Pencil Holder: Design and print a pencil holder to keep your desk tidy.	CO5
10.5	Wall Hooks: Print decorative wall hooks for hanging lightweight items such as keys, hats, or small accessories.	CO5
Required Software and Tools		
CNC TC, CNC VMC, Welding Machine. 3D Printer, 3D Modeling Software		

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Environmental Science	**L-T-P [2-0-0]**
Subject Code: BNC0302	**Applicable in Department: ME**

Pre-requisite of Subject:

Environmental science is an interdisciplinary field that requires a solid foundation in various subjects to fully understand the complex interactions within the environment.

Building a strong foundation in subjects like physics, chemistry, biology, maths, geography, economics will equip students with the knowledge and skills necessary to tackle complex environmental challenges and contribute to sustainable solutions.

Course Objective:

To help the students in realizing the inter-relationship between man and environment and help the students in acquiring basic knowledge about environment.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids	K_1
CO 2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation	K_2
CO3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K_2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K_2
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K_2

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Basic Principle of Ecology	Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical	Smart board, PPTS, Reference Books,	4	Assignment- 1	CO1

		Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Eco restoration				
2	Natural Resources and Associated Problems	Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles. Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.	Smart board, PPTS, Reference Books,	4	Assignment- 2	CO2
3	Biodiversity Succession and Non-Renewable Energy Resources	Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance. Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability.	Smart board, PPTS, Reference Books	4	Assignment- 3	CO3
4	Pollution and Solid Waste Management	Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox,CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health,	Smart board, PPTS, Reference Books	4	Assignment- 4	CO4

		Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment, Climate change, global warming, acid rain, ozone layer depletion.				
5	Role of Community and Environmental Protection Acts	Role of community, women and NGOs in environmental protection, Bio indicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law. F. District Environmental Action Plan. Climate action plans.	Smart board, PPTS, Reference Books	4	Assignment- 5	CO5
			Total	**20**		

Textbooks	
S. No.	**Book Details**
1.	Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.
2.	Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.
3.	Environmental studies and Environmental engineering –By Dr. H.H
4.	Environmental Studies by Dr B.S. Chauhan

Reference Books	
S. No.	**Book Details**
1.	Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi
2.	A Textbook of environmental Science By Shashi Chawla
3.	Environmental studies- R, Rajagopalan -Oxford Pubtiotion

Links

- Ecosystems and Biomes | Classroom Learning Video - YouTube
- Environmental Science EVS Unit 3 Natural Resources Land Resources AEC semester 1/2 DU SOL NCWEB P -1 (youtube.com)
- 'Biodiversity & its Conservation' In Just 24 Minutes🔥🔥| Ultimate Revision Series | Neet 2022 (youtube.com)
- Air Pollution | What Causes Air Pollution? | The Dr Binocs Show | Kids Learning Videos Peekaboo Kidz (youtube.com)
- Environmental Pollution - Environment and Ecology for UPSC IAS Part 2 (youtube.com)

NIET Greater Noida	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Artificial Intelligence and Cyber Ethics	**L-T-P [2-0-0]**
Subject Code: BNC0301	**Applicable in Department: All Branches**
Prerequisite of Subject: Basic understanding of computer systems and ethics.	
Course Objective: The course aims to foster critical thinking about ethical issues, promote responsible use of technology, and ensure students can identify, analyze, and address ethical dilemmas in Artificial Intelligence and cyber domains.	

Course Outcome (CO)

Course Outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level (KL)**
CO 1	Learn key principles of AI ethics, summarizing ethical considerations and applications in AI development and deployment.	K2
CO2	Apply policies and framework for Fairness in AI and Machine Learning	K3
CO3	Apply privacy and security concepts, risk management and regulatory compliance in the field of AI and Cyber Security.	K3
CO4	Understand the nature of cybercrimes, the principles of intellectual property rights (IPR), and the legal measures necessary to address and prevent these issues.	K2
CO5	Describe the impact of AI in Society, employment and workforce.	K2

Syllabus

Unit No	Module	Topics Covered	Pedagogy	Lecture Required (T=L+P)	Aligned Practical/Assignment/Lab	CO Mapping
1	An overview to AI Ethics	Definition of AI. Ethical principles in AI. Sources of AI data. Legal implications of AI security breaches, Privacy and AI	Lecture and Case studies	5 L	Assignment	CO1

		regulations. Key Principles of responsible AI, transparency and accountability, Dual-use dilemma, Human-centric design. Introduction to Cyber Laws and Ethics, Historical development of cyber laws, Legal frameworks.				
2	Fairness and Favoritism in Machine 0Learning	Introduction to Fairness and Bias in AI, Types of Fairness and Bias. Impact of Bias and Fairness in AI, techniques for measuring Fairness and Bias. Techniques for mitigating bias. Current policies and frameworks for fairness in AI. Bias in data collection, Fairness in data processing. Generative AI, Types of Bias in Generative AI.	Lecture and Case studies	6 L	Assignment	CO2
3	AI Ethics and Cybersecurity Principles	Importance of privacy and security in AI, AI specific security tools and software, privacy-preserving machine learning (PPML) and privacy-preserving data mining (PPDM) Ethical considerations in phases of AI development life cycle, Risk management: Risk assessment and incident response Regulatory compliance: GDPR, HIPAA Case studies: Implementation of AI ethics guidelines and best practices in engineering projects, Ethical decision-making processes and tools for engineers working with AI technologies	Lecture and Case studies	8 L	Assignment	CO3
4	Cybercrimes, IPR and Legal Measures	Types of cybercrimes and their impact, Legal measures for cybercrime prevention and prosecution. IPR: Copyrights, trademarks, patents, and trade secrets, Ethical implications of intellectual property, Cyber security and privacy issues	Lecture and Case studies	5 L	Assignment	CO4

5	AI Contribution to Social Evolution	Positive and negative political impacts of AI, Role of AI in social media and communication platforms, AI-generated content and deepfakes, Applications of AI in addressing global challenges, Key technical stakeholders in AI deployment: developers, researchers, policymakers, Technical Impacts on Employment and Workforce: Automation technologies: robotic process automation (RPA), autonomous systems	Lecture and Case studies	6 L	Assignment	CO5
Total				**30 Hours**		

Text Books	
Sr No	**Book Details**
1	Introduction to Information Security and Cyber Laws, Simplified Chinese Edition by Surya Prakash Tripathi, Ritendra Goel, 1 January ,2014.
2	AI ETHICS: Paving the Path for Responsible Machine Learning, Shivanand Kumar, 2014.

Reference Books	
Sr No	**Book Details**
1	AI ETHICS (The MIT Press Essential Knowledge series), by Mark Coeckelbergh, 2018
2	Computers, Internet and New Technology Laws by Karnika Seth – by Karnika

Links	
Unit 1	https://www.youtube.com/watch?v=VqFqWIqOB1g
Unit 2	https://www.youtube.com/watch?v=hVJqHgqF59A
Unit 3	https://www.youtube.com/watch?v=O5RX_T4Tg24
Unit 4	https://www.youtube.com/watch?v=RJZ0pxcZsSQ
Unit 5	https://www.youtube.com/watch?v=I9FOswjTSGg

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Material Science	**L-T-P [3-1-0]**
Subject Code: BOE0462	**Applicable in Department: ME**

Pre-Requisite of Subject:
Basic Understanding of Chemistry, Physics, and Stress-Strain Response.

Course Objective:
The student cover various aspects of advance engineering materials. Firstly, an investigation into the Phase diagram will be conducted, studying the relationships between phases of materials under different conditions. Next, an exploration of strengthening processes, including heat treatment techniques, will be undertaken to enhance material properties. Additionally, there will be a focus on the study of new materials and their diverse applications. Another area of interest will be the analysis of composite materials and their unique characteristics. Finally, the research will encompass the study of Material characterization and Metallography, providing insights into the structure and properties of materials.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Analyze the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy.	K_3
CO2	Understand and apply heat treatment techniques, TTT diagrams, and diffusion principles for material properties.	K_3
CO3	Understand the features, classification, applications of newer class materials such as smart materials, piezoelectric materials, biomaterials.	K_2
CO4	Understand the fundamentals of composite materials and its applications.	K_2
CO5	Interpret Materials characterization and Metallographic techniques such as X-Ray diffraction, scanning electron microscopy.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Properties of Materials & Phase Diagram	Mechanical Properties, Stress-strain response of metallic, ceramic and polymer materials, yield strength, tensile strength and modulus of elasticity, toughness, plastic deformation, hardenability, fatigue, creep and fracture, Solid solutions, Solubility limit, Gibb's phase rule, binary phase diagrams, intermetallic compounds, iron-carbon phase diagram, cold and hot working of metals, recrystallization, and grain growth. Microstructure, properties, and applications of ferrous and nonferrous alloys.	T1, R2, Marker & Duster/PPT/Animated Videos/ Experiment based learning/ Activity based learning	8	Assignment-1 and Experiment-4, 5, 6, 11, 12	CO1
2	Heat Treatment and Diffusion	Heat treatment: Various types of heat treatments such as Annealing, Normalizing, Quenching, Tempering (Aus-tempering, Martempering), and various case hardening processes. Time Temperature Transformation (TTT) diagram. Diffusion: Introduction to Diffusion, Types of diffusion, Fick's laws, Factors Affecting Diffusion, Diffusion in Sintering, Doping of semiconductors, Diffusion-based surface treatments.	T1, R2, Marker & Duster/PPT/Animated Videos/ Experiment based learning	8	Assignment-2 and Experiment-3	CO2
3	Smart and Advanced Materials	Smart materials: classification, piezo electric materials, Rheological materials, chromic materials, thermo-responsive materials magneto strictive materials, Electrostrictive materials, Nanomaterials, Biomaterials and applications, super-alloys, shape memory alloys, exhibiting ferroelectric, opto-electric, semi-conductive, photoconductive, and superconductive properties, and applications.	T1, R2, Marker & Duster/PPT/Animated Videos	8	Assignment-3	CO3
4	Composite Materials	Introduction to Composite, classification of composites, Application of composite, Types of matrix and reinforcements, Fabrication methods of	T1, R2, Marker & Duster/PPT/Animated Videos	8	Assignment-4	CO4

		composite materials.				
5	Material characterization and Metallography	Materials characterization and Metallographic techniques; X-Ray diffraction, scanning electron microscopy, transmission electron microscopy, atomic force microscopy, scanning tunnelling microscopy, atomic absorption spectroscopy, and differential scanning calorimetry. Introduction to various NDT Techniques.	T1, R2, Marker & Duster/PPT/Animated Videos/ Experiment based learning	8	Assignment-5 and Experiment-1, 2	CO5
			Total	**40**		

Textbooks	
S. No.	**Book Details**
1.	William D., Jr. Callister and David G. Rethwisch, "Materials Science and Engineering: An Introduction". Wiley and Sons; 8th edition (December 30, 2009); Language: English. ISBN-10: 0470419970.
2.	R. K. Rajput, "A Textbook of Material Science". S.K. Kataria& Sons, 2013, ISBN 13: 9789350144183
3.	F. Shackelford, "Introduction to Material Science for Engineers". Pearson Education, 2014, ISBN 13: 9780133826654
4.	P N Rao, Manufacturing Technology – Foundry, Forming, and Welding, 4th edition, McGraw Hill Education (India) Private Limited.
5.	Manufacturing science by A. Ghosh and AK Mallik Eat and west publishing house

Reference Books	
S. No.	**Book Details**
1.	Tariq A. Khraishi and Marwan S. Al-Haik, "Experiments in Materials Science and Engineering
2.	V. Raghavan, "Materials Science and Engineering: A First Course". PHI Learning, ISBN 13: 9788120350922
3.	B. L. Juneja Sekhon, Fundamentals of Metal Cutting and Machine Tools, New Age Intl.

Links	
Unit 1:	NPTEL :: Metallurgy and Material Science - NOC:Introduction to Materials Science and Engineering
Unit 2:	NPTEL :: Metallurgy and Material Science - NOC:Heat Treatment and Surface Hardening - I NPTEL :: Metallurgy and Material Science - Phase Transformations and Heat Treatment
Unit 3:	NPTEL :: Metallurgy and Material Science - NOC:Advanced Materials and Processes NPTEL :: Mechanical Engineering - NOC:Smart Materials and Intelligent System Design
Unit 4:	NPTEL :: Mechanical Engineering - NOC:Introduction To Composites NPTEL :: Mechanical Engineering - NOC:Manufacturing of Composites
Unit 5:	NPTEL :: Metallurgy and Material Science - NOC:Material Characterization

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Mechanical Engineering

Subject Name: Engineering Mathematics-III	**L-T-P [3-1-0]**
Subject Code: BAS0401B	**Applicable in Department: ME**

Pre-requisite of Subject:
Knowledge of Mathematics I and II of B. Tech or equivalent.

Course Objective:
Concept of function of complex variables, Partial differential equations & their applications, Numerical techniques for various mathematical tasks and numerical aptitude. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO 1	Apply the concept of partial differential equation to solve partial differential Equations and problems concerned with partial differential equations	K_3
CO 2	Apply the concept of fourier transform and Z-transform to solve difference equations.	K_3
CO3	Apply the working methods of complex functions for finding analytic functions.	K_3
CO 4	Apply the concepts of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals	K_3
CO 5	Solve the problems of Number System, Permutation & Combination, Probability, Set theory, Function, Data Interpretation, Syllogism.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	**Partial Differential Equation and its Applications**	Introduction of partial differential equations, Second order linear partial differential equations with constant coefficients. Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one-dimensional wave and heat equations	Class room Teaching, Smart Board, PPT, M-tutor.	8	**Assignment 1.1**	CO1

2	**Integral Transforms**	Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one-dimensional heat transfer equations and wave equations, Z- transform and its application to solve difference equations.	Class room Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-2.1**	CO2
3	**Complex Variable – Differentiation**	Limit, Continuity and differentiability, Functions of complex variable, Analytic functions, Cauchy- Riemann equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions, Mobius transformation and their properties.	Class room Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-3.1**	CO3
4	**Complex Variable – Integration**	Complex integrals, Contour integrals, Cauchy-Goursat theorem (Statement), Cauchy integral formula (Statement), Taylor's series, Laurent's series, Liouvilles's theorem(Statement), Singularities, Classification of Singularities, zeros of analytic functions, Residues, Methods of finding residues, Cauchy Residue theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(sin\theta, cos\theta)$ and $\int_{-\infty}^{\infty} f(x)dx$.	Class room Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-4.1**	CO4
5	**Aptitude-III**	Number System, Permutation & Combination, Probability, Set theory, Function, Non Verbal Reasoning. Data Interpretation, Syllogism.	Class room Teaching, Smart Board, PPT, M-tutor.	8	**Assignment-5.1**	CO5
			Total	**40**		

Textbooks

S. No.	Book Details
1.	B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd., 2008.
2.	B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3.	R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House 2002.
4.	E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons, 2005.

Reference Books

S. No.	Book Details
1.	Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning, 2007.
2.	Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.

Links

Unit 1: NPTEL :: Mathematics - NOC:Partial Differential Equations
Unit 2: NPTEL :: Mathematics - NOC:Integral Transforms And Their Applications
Unit 3: NPTEL :: Mathematics - Complex Analysis
Unit 4: NPTEL :: Mathematics - Complex Analysis
Unit 5: NPTEL: Discrete Mathematics, IIT Roorkee
NPTEL :: Multidisciplinary - NOC:Research Methodology
NPTEL :: Mathematics - NOC: Introduction to Probability Theory and Stochastic Processes

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Technical Communication		**L-T-P [2-1-0]**
Subject Code: BASL0401		**Applicable in Department: All Branches**
Pre-requisite of Subject: B2 (CEFR level) in the Core Skills test; B1/B2 in the Speaking and Writing tests		
Course Objective: To develop communication and critical thinking skills necessary for succeeding in the diverse and ever-changing workplace of the twenty first century and help the students communicate effectively, creatively, accurately, and appropriately.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level(KL)**
CO1	Comprehend the principles and functions of technical communication.	K2
CO2	Write for a specific audience and purpose to fulfil the provided brief.	K5
CO3	Identify and produce different kinds of technical documents.	K2, K3
CO4	Apply effective speaking skills to efficiently carry out official discourses.	K3
CO5	Demonstrate understanding of communication through digital media.	K5

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment / Lab Nos	CO Mapping

1	**Introduction to Technical Communication**	• Definition, Process, Types, Levels, Flow and Barriers to Technical Communication with emphasis on cultural differences and gender sensitivity. Gender-neutral language. • Need for and Importance of Technical Communication - Significance of audience in technical communication • Tone- Formality and Informality	Interactive & Flipped classroom method	6 L	Assignment 1	CO1
2	**Technical Writing 1**	• Technical writing and technical vocabulary • Business letters/emails a) Types and format, Content Organization b) Cultural Variety, Tone, and Intention c) Bad news message, good news message d) Advertisements, Editorial press releases • Notices, agenda, and minutes of meeting • Job application, CV, and Resume'	Interactive & Flipped classroom method	10 L	Assignment 2	CO2
3	**Technical Writing 2**	• Technical reports – types & formats • Structure of a report (short & long) • Ethical Writing – Copy Editing, Referencing and Plagiarism • Technical Proposal - structure and types • Technical/ Scientific paper writing	PPT, Activities	7 L	Assignment 3	CO3
4	**Public Speaking**	• Components of effective speak • Seminar and conference presentation • Conducting/ participating in meetings • Appearing for a job interview	Interactive sessions, activities, mock interviews	8 L	Assignment 4	CO4
5	**Virtual/Remote Communication**	• Understanding remote work – using different online platforms • Virtual etiquette- email ids, usernames • Developing online written correspondence- blogs, WhatsApp, LinkedIn. What not to write on social media. • Participating in online Conferences/seminars/meetings • Mobile Etiquette	Interactive sessions, activities	8 L	Assignment 5	CO5
Total			**39 Hours**			

Textbooks	
Sr No	**Book Details**
1	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, 4th Edition, Oxford University Press, 2023, New Delhi.
Reference Books	
Sr No	**Book Details**
1	Technical Communication: A Practical Guide by William S. Pfeiffer and Kaye A. Adkins, Pearson, 2020, UK.
2	The Essentials of Technical Communication by Elizabeth Tebeaux and Sam Dragga, Oxford University Press, 2021, UK.
3	Technical Communication Today by Richard Johnson-Sheehan, Pearson, 2020, UK
4	Strategic Communication in Technical Professions" by Susan K. Miller-Cochran and Jason Tham, Routledge, 2020, UK.
5	Technical Writing for Engineers & Scientists by Michelle V. Z. Holmes, McGraw Hill, 2020, US.
6	Speaking: Second Language Acquisition, from Theory to Practice by William Littlewood, Cambridge University Press, 2022, UK.
7	The Writing Revolution: A Guide to Advancing Thinking Through Writing in All Subjects and Grades by Judith C. Hochman and Natalie Wexler, Jossey-Bass, 2022, USA.

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Heat & Mass Transfer	**L-T-P [3-0-0]**
Subject Code: BME0401	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic Thermodynamics, Fluid Mechanics, and Engineering Mathematics

Course Objective:
Learn the concept of heat transfer in different fields of engineering. Learn about the application of Fin in Automobile and other electrical equipment. Learn about free and forced convection. Learn about radiation and how to minimize the effect of radiation. Learn about the application of heat exchanger in industry.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Demonstrate the fundamentals of heat and mass transfer and its industrial applications.	K_1
CO2	Solve the problems of Heat conduction and its application in different industry.	K_3
CO3	Analyze the theoretical and numerical approach of free and forced convection and its application to industry.	K_3
CO4	Calculate the radiation heat transfer and its application as a heat shield.	K_3
CO5	Design and analyze heat exchangers and its different industrial application. Also differentiate between concept of boiling and condensation and explain mass transfer.	K_3

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Steady State Conduction	Introduction to Heat Transfer:	Smart board/PPTs/Animated	8	Assignment-1 and Experiment-1-5.	CO1

		Thermodynamics and Heat Transfer. Modes of Heat Transfer: Conduction, convection and radiation. Effect of temperature on thermal conductivity of materials. Conduction: General differential heat conduction equation in the rectangular, cylindrical coordinate systems. Initial and boundary conditions. Steady State one-dimensional Heat conduction: Simple and Composite Systems in rectangular, cylindrical and spherical coordinates with and without energy generation; Concept of thermal resistance. Analogy between heat and electricity flow; over all heat transfer coefficient; Critical radius of insulation.	videos			
2	Transient Conduction	Heat transfer from extended surfaces, Fins of uniform cross-sectional area; Errors of measurement of temperature in thermometer wells. Transient Conduction: Transient heat conduction; Lumped capacitance method; Time constant; Unsteady state heat conduction in one dimension only, Heisler charts.	Smart board/PPTs/Animated videos	7	Assignment-2	CO2
3	Convection	Forced Convection: Basic concepts; Hydrodynamic boundary layer; Thermal boundary layer; Approximate integral boundary layer analysis; Analogy between momentum and heat transfer in turbulent flow over a flat surface; Mixed boundary layer; Flow over a flat plate; Flow across a single cylinder and a sphere; Flow inside ducts; Thermal entrance region, Empirical heat transfer relations, Liquid metal heat transfer. Natural Convection: Physical mechanism of natural convection; Buoyant force; Empirical heat transfer relations for natural convection over vertical planes and cylinders, horizontal plates and cylinders, and sphere, combined free and forced convection.	Smart board/PPTs/Animated videos	10	Assignment-3 and Experiment-4-9.	CO3
4	Radiation	Basic radiation concepts; Radiation properties of surfaces; Black body radiation Planck's law, Wein's displacement law, Stefan Boltzmann law, Kirchhoff's law; Gray body; Shape	Smart board/PPTs/Animated	7	Assignment-4 and Experiment-10, 11.	CO4

		factor; Black body-radiation; Radiation exchange between diffuse nonblack bodies in an enclosure; Radiation shields; Radiation combined with conduction and convection; Absorption and emission in gaseous medium; Solar radiation.	videos			
5	Heat Exchanger	Heat Exchangers: Types of heat exchangers; Fouling factors; Overall heat transfer coefficient; Logarithmic mean temperature difference (LMTD) method; Effectiveness-NTU method; Compact heat exchangers. Condensation and Boiling: Introduction to condensation phenomena; types of condensation, Heat transfer relations for laminar film condensation on vertical surfaces and on outside & inside of a horizontal tube; Dropwise condensation; Heat pipes; Boiling modes, pool boiling. Introduction to Mass Transfer: Introduction; Fick's law of diffusion; Steady state equimolar counter diffusion; Steady state diffusion though a stagnant gas film, diffusion in hemodialysis.	Smart board/PPTs/Animated videos	8	Assignment-5 and Experiment-12-14.	CO5
			Total	**40**		

Textbooks	
S. No.	**Book Details**
1.	Heat and Mass Transfer by Cengel, McGraw-Hill
2.	A Textbook on Heat Transfer, by Sukhatme, University Press.
3.	Heat and Mass Transfer by Rudramoorthy and Mayilsamy, Pearson Education
4.	Heat and Mass Transfer by R K Rajput, S Chand Publication.

Reference Books	
S. No.	**Book Details**
1.	Fundamentals of Heat and Mass Transfer, by Incroperra & DeWitt, John Wiley and Sons
2.	Heat Transfer by J.P. Holman, McGraw-Hill

Links

1. NPTEL Heat and Mass Transfer, IIT Bombay
2. NPTEL Convective Heat and Mass Transfer, IIT Bombay
3. NPTEL Heat Exchangers: Fundamentals and Design Analysis, IIT Kharagpur
4. NPTEL Radiative Heat Transfer, IIT Roorkee

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Computer Integrated Manufacturing	**L-T-P [2-0-0]**
Subject Code: BME0402	**Applicable in Department: ME**

Pre-requisite of Subject:

1. Basic knowledge of manufacturing processes and systems.
2. Familiarity with machine components and mechanics of machine movement.
3. Essential programming skills and a grasp of numerical methods.

Course Objective:

This course introduces Computer Integrated Manufacturing (CIM) and Smart Manufacturing, covering essential processes, data flow, and subsystem integration. Students will learn about computer graphics, including CAD systems and geometric transformations. The course also covers CNC machines, group technology, and their manufacturing applications. Advanced topics include process planning, flexible manufacturing systems, and modern technologies such as AI, Machine Learning, Deep Learning, and IoT, focusing on their roles in enhancing manufacturing processes and efficiency.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Understand the concept of computer integrated manufacturing.	K_2
CO2	Understand Different types of geometric transformations used during CAD geometry Generation and display and their evaluation.	K_3
CO3	To demonstrate CNC machines and write down the part program.	K_3
CO4	Understand the concept of Computer aided process planning, group technology and flexible manufacturing	K_3
CO5	To apply the concept of modern computer-based technologies.	K_3

Syllabus

Unit No	**Module Name**	**Topic covered**	**Pedagogy**	**Lecture Required (L+P)**	**Practical/ Assignment/ Lab Nos**	**CO Mapping**

1	Introduction to CIM	Introduction to CIM, Data flow in CIM, CIM wheel, Processes involved, CIM integration, sub system of CIM, Introduction to Smart manufacturing,	PPT, Smart Board	8	Assignment-1	CO1
2	Computer Graphics	Introduction to design, Computer graphics display, Coordinate systems in CAD, Transformation of geometry, Color Models, Numerical problems based on transformation of geometry.	PPT, Smart Board, Physical Device	8	Assignment-2	CO2
3	CNC Machines & Group Technology	CNC machining centres.: Drilling centres, milling centres, turning centres CNC Tooling: CNC tooling mechanism, ATC. Adaptive control Group Technology: Benefits of group Technology. Part Family. Coding Systems. Limitations of Group Technology	PPT, Smart Board, CNC, VMC	8	Assignment-3	CO3
4	Process Planning and Flexible Manufacturing	Process planning: Process Planning, Computer-Aided Process Planning, Concurrent Engineering Design for Manufacturing Advanced Manufacturing Planning Flexible manufacturing system: Flexible Manufacturing System FMC/FMS Components. FMS Applications Considerations Analysis of Flexible Manufacturing Systems Alternative Approaches to Flexible Manufacturing	PPT, Smart Board	8	Assignment-4	CO4
5	Modern Technology in Manufacturing	Artificial Intelligence (AI): Artificial Narrow Intelligence, Artificial General Intelligence, Artificial Super Intelligence Machine Learning (ML): Supervised Learning, Unsupervised Learning, Reinforcement Learning Deep learning (DL), Digital manufacturing Smart Manufacturing: The Product Life Cycle, Value Chain Management Internet Of Things (IOT) in manufacturing: Digital/connected factory, Production flow monitoring, Inventory Management, Plant Safety and Security: Packaging Optimization	PPT, Smart Board	8	Assignment-5	CO5
			Total			

Textbooks	
S. No.	**Book Details**
1.	Handbook of Flexible Manufacturing System – Editor: Nand K. Jha (Academic Press, San Diego, California

2.	Automation, Production System & Computer Integrated Manufacturing-Groover (PHI)
3.	Flexible Manufacturing System – Wernecks (Spring- Verlag).
4.	Flexible Manufacturing Cells and systems – W. W.Luggen (PHI)
5.	CAD/CAM- P. N. Rao (Tata McGraw Hill)
6.	Mikell P. Groover, Automation, Production systems and Computer Integrated Manufacturing System, Prentice Hall, 2007.
Reference Books	
S. No.	**Book Details**
1.	Handbook of Flexible Manufacturing System – Editor: Nand K. Jha (Academic Press, San Diego, California).
2.	Automation, Production System & Computer Integrated Manufacturing-Groover (PHI).
3.	Performance Modelling of Automated Manufacturing Systems –Vishwanathan & Narahari (PHI)
Links	

1. NPTEL Computer Integrated Manufacturing, IIT Kanpur
2. NPTEL Computer Numerical Control CNC of Machine Tools and Processes, IIT Kharagpur
3. NPTEL Computer Aided Design and Manufacturing II, IIT Delhi
4. NPTEL Manufacturing Systems Management, IIT Madras

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Measurement and Metrology	**L-T-P [3-0-0]**
Subject Code: BME0403	**Applicable in Department: ME**

Pre-requisite of Subject:
Knowledge of Tolerance, Fit, Surface Texture, and Optics

Course Objective:

1. Understand principles of dimensional metrology, standardization, and tolerancing.
2. Gain proficiency in gauge design, limit gauging, and inspection techniques.
3. Learn advanced measuring technologies such as CMMs, interferometers, and laser vision.
4. Familiarize with GD&T principles and feature inspection methods.
5. Develop skills in using metrology software and interfacing with advanced measuring systems.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Ability to apply dimensional metrology principles for quality control and compliance with standards.	K_3
CO2	Competence in designing gauges, conducting limit gauging, and ensuring selective assembly.	K_4
CO3	Proficiency in operating CMMs, interferometers, and laser vision systems for accurate measurements.	K_3
CO4	Capability to interpret GD&T specifications and perform feature inspections accurately.	K_4
CO5	Understanding of metrology software and its application in precision measurements for manufacturing processes.	K_3

Syllabus

Unit No	**Module Name**	**Topic covered**	**Pedagogy**	**Lecture Required**	**Practical/ Assignment/**	**CO Mapping**

				(L+P)	Lab Nos	
1	Introduction to Metrology	Introduction to Dimensional Metrology, Standardization, Interchangeability, Selective assembly, Indian standard specifications, Application of tolerances, Limit gauging- Taylor's principles of limit gauging, Inspection by measurement, and Interferometers.		8	Assignment-1	CO1
2	Inspection	GD&T, Applications of Dimensional Inspection, Inspection of Surface Quality, Feature inspection- Straightness, Flatness, Parallelism, Squareness, Circularity, and Roundness.		8	Assignment-2	CO2
3	Measuring Machines	CMMs, Applications, Types, instructions, Materials used for different elements, Probing, Hard Probing and Soft probing, Construction and Working Principle of Touch Trigger Probe, Alignment, Types of errors, Flow Measurement, Temperature Measurement, Measurements of Force and Torque.		8	Assignment-3	CO3
4	Advanced Metrology	Advanced measuring machines, CNC systems, Laser vision, In-process gauging, 3D metrology, Metrology software, Nanotechnology instrumentation, Stage position metrology, Testing and certification services, Optical system, Lens, Coating, Precision lens assembly techniques, Complex optomechanical assemblies, Contact bonding and other joining technologies and Radioactive technologies.		8	Assignment-4	CO4
5	Computer-Aided Inspection	Computer Aided Metrology- Principles and interfacing, Software metrology. Laser metrology- Applications of lasers in precision measurements - Laser interferometer, Speckle measurements, Laser scanners. Coordinate Measuring Machine – Non-contact CMM Electro-optical sensors for dimensional metrology- non-contact sensors for surface finish measurements, Image processing and its application in metrology.		8	Assignment-5	CO5
			Total	**40**		

Textbooks	
S. No.	**Book Details**
1.	Experimental Methods for Engineers by Holman, MCGRAW HILL INDIA
2.	Mechanical Measurements by Beckwith, Pearson
3.	Principles of Measurement Systems by Bentley, Pearson

4.	Metrology of Measurements by Bewoor and Kulkarni, MCGRAW HILL INDIA
5.	Measurement Systems, Application Design by Doeblein, MCGRAW HILL INDIA
6.	Hume K.J., “Engineering Metrology”, MacDonald and Co
Reference Books	
S. No.	**Book Details**
1.	Jain, R.K., “Engineering Metrology” Khanna Publishers
2.	Jain, R.K., “Mechanical Measurement” Khanna Publishers.
3.	Gupta S.C, Engineering Metrology, Dhanpat Rai Publications.
Links	

1. NPTEL :: Mechanical Engineering - NOC:Engineering Metrology
2. NPTEL : Computer Aided Design and Manufacturing (Mechanical Engineering) (digimat.in)
3. NPTEL Metrology, IIT Madras

NIET Greater Noida Autonomous Institute	**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY** **GREATER NOIDA-201306** **(An Autonomous Institute)** **School of Mechanical Engineering**

Subject Name: Technical Communication Lab	**L-T-P [0-0-2]**
Subject Code: BASL0451	**Applicable in Department: CSE/CSE (R)/IT/DS/IoT/AI/AIML/CS/BT/ECE/CYS/ME**
Prerequisite of Subject: B2 (CEFR level) in the Core Skills test; B1/B2 in the Speaking and Writing tests	
Lab Experiments	
Course Objective: To develop communication and critical thinking skills necessary for succeeding in the diverse and ever-changing workplace of the twenty first century and help the students communicate effectively, creatively, accurately, and appropriately.	

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level(KL)**
CO 1	Comprehend the principles and functions of technical communication.	K2
CO2	Write for a specific audience and purpose to fulfil the provided brief.	K5
CO3	Identify and produce different kinds of technical documents.	K2, K3
CO4	Apply effective speaking skills to efficiently carry out official discourses.	K3
CO5	Demonstrate understanding of communication through digital media.	K5

List of Practicals

Lab No.	**Topic**	**Program Logic Building**	**CO Mapping**

1	Case Study Analysis	The students will be able to develop their critical thinking and analytical skills.	CO1
2	Email Role Reversal: Writing and responding to emails in peer groups	The students will practice writing and responding to professional emails.	CO2
3	Infographics – Data Analysis and Interpretation Task	The students will develop their ability to decipher important information from charts, graphs, tables, and diagrams.	CO3
4	Document Redesign Challenge: Redesigning existing technical documents to improve readability	The students will develop their ability to write and edit professional documents.	CO3
5	Abstract Formulation and Referencing	The students will be able to write research papers with proper source citations.	CO3
6	Case Study presentations	The students will improve their analytical skills and by presenting improve their speaking skills.	CO4
7	Presentation on Project Report	The students will develop professional speaking skills.	CO4
8	Ted talk simulation – summarising a Ted Talk	The students improve their ability to condense speeches.	CO4
9 & 10	Mock Interviews	The students will practice and enhance their interview skills.	CO4
11 & 12	Webinar Presentations/Online Interviews	The students will improve their ability to make presentations in professional scenarios and perform well in online interviews.	CO5

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Mechanical Engineering

Subject Name: Thermodynamics and Heat & Mass Transfer Lab	**L-T-P [0-0-4]**
Subject Code: BME0451	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic Thermodynamics, Fluid Mechanics, and Engineering Mathematics

Course Objective:
The objective is to provide practical experience in measuring and analyzing thermal properties, heat transfer processes, and fluid flow. Students will conduct experiments, interpret data, and apply theoretical concepts to enhance their understanding of thermodynamic systems and heat transfer mechanisms in real-world applications.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Demonstrate and calculate the heat transfer rate through conduction, convection, radiation, and heat exchanger units.	K_2
CO2	Demonstrate and calculate the performance of petrol and diesel engine test rig.	K_2
CO3	Demonstrate the complete working of boiler and compounding of turbines.	K_2

List of Practical's

S. No.	**Details of Practical**	**CO Mapping**
1	Conduction – Experiment on Composite plane wall	CO1
2	Conduction – Experiment on Composite cylinder wall	CO1
3	Conduction – Experiment on Transient heat conduction	CO1
4	Conduction – Determination of Thermal conductivity of insulating slab	CO1
5	Conduction – Determination of Thermal conductivity of insulating powder	CO1
6	Convection - Pool boiling experiment	CO1

7	Convection - Experiment on heat transfer through Pin fin	CO1
8	Convection - Heat Pipe experiment.	CO1
9	Convection - Determination of thermal conductivity of fluid	CO1
10	Radiation- Determination of Stefan–Boltzmann constant	CO1
11	Radiation- Determination of Emissivity of a plate	CO1
12	Heat exchanger - Counter flow experiment	CO1
13	Heat exchanger - Parallel flow experiment	CO1
14	Heat exchanger - Plate type heat exchanger experiment	CO1
15	Study of two stroke Petrol Engine and Diesel Engine	CO2
16	Study of four stroke Petrol Engine and Diesel Engine	CO2
17	To study boilers and their accessories and mountings.	CO3
18	To study various types of compounding of turbine.	CO3
Required Software and Tools		
Conduction Setup, Convection setup, Heat Exchanger, Diesel Engine, Petrol Engine.		

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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Subject Name: Computer Aided Modelling Lab	**L-T-P [0-0-4]**
Subject Code: BME0452	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic of computer aided engineering graphics.

Course Objective:
The objective is to equip students with practical skills in using CAD software to create, analyze, and modify 3D models. Students will learn to design complex geometries, perform simulations, and generate technical drawings, preparing them for real-world engineering and design challenges.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Apply basic concepts and methods from design engineering to explore creative solutions of real-world problems.	K_2
CO2	Create parts, assemblies, flexible & sheet metal modelling, diagram complex systems and detailed engineering concept drawings.	K_2
CO3	Apply industry standards in the sketching, 3D modelling, validation and visualization of the products & assemblies.	K_2

List of Practical's

S. No.	**Details of Practical**	**CO Mapping**
1	To draw polygons using a modeling software.	CO1
2	To draw isometric projections of a given solid using modeling software.	CO1
3	Modeling of simple machine components (bracket, flange, nut and bolt).	CO1
4	Modeling of carburetor parts I: body and plate	CO1
5	Modeling of carburetor parts II: shaft, arm, and cover	CO1
6	Modeling of I.C. engine components I: connecting rod and cylinder block	CO2

7	Modeling of I.C. engine components II: piston and crankshaft	CO2
8	To assemble pre modelled carburetor parts that are body, plate, shaft, arm, and cover in a CAD software.	CO2
9	To assemble pre modelled internal combustion engine components that are connecting rod, cylinder block, piston, and crankshaft in a CAD software.	CO2
10	To place a punch and die form on a Sheetmetal using CAD software.	CO3
11	To model a structural component using welding in CAD software.	CO3
12	To model and force simulation of a structural component.	CO3
13	Flow simulation of a fan using CAD software.	CO3
14	To create a drawing with different views of a 3D modeled component.	CO3
Required Software and Tools		
Modelling Software		

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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Subject Name: Machine Design & Application of FEA (Workshop Mode)	**L-T-P [0-0-6]**
Subject Code: BME0455	**Applicable in Department: ME**

Pre-requisite of Subject:

1. Knowledge of Materials
2. Strength of Materials
3. Basic Mathematics

Course Objective:

This course equips students with practical skills in using Finite Element Analysis (FEA) to design, analyze and visualize stresses in mechanical components, including rods, plates, shafts, gears, and bearings. Topics cover stress analysis, cyclic stresses, fatigue, and thermal modeling, focusing on practical applications and criteria for failure.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO1	Draft components in FEA software, selecting different modules of FEA.	K_2
CO2	Analyze static and fluctuating stress in different components using different criterion.	K_5
CO3	Design & Analysis Spur for different application.	K_5
CO4	Design & Analysis of Worm gear for different application.	K_5
CO5	Select the suitable bearing for given operating conditions.	K_5

List of Practical's

S. No.	**Details of Practical**	**CO Mapping**
1	Introduction to FEA Packages	CO1
2	Direct stress in uniform and non-uniform cross section rod	CO1
3	Shear stress on plates under direct load	CO1

4	Application of load on shaft (bending)	CO1
5	Application of bending load and torque on shaft	CO1
6	Analysis of plate using FEA package under fluctuating load, Visualization of stress, criterion of failure.	CO2
7	Analysis of shaft using FEA package under fluctuating load, Visualization of stress, criterion of failure.	CO2
8	Cyclic stresses, Fatigue and endurance limit, Stress concentration, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman & Gerber criteria.	CO2
9	Design and analysis of plate having notch or circular hole FEA package under fluctuating load, Visualization of stress, criterion of failure.	CO2
10	Stress visualization in Spur Gears using FEA Package	CO3
11	Stress visualization in Helical Gears using FEA Package	CO3
12	Stress visualization in spur gears and gear shaft using FEA Package	CO4
13	Stress visualization in worm gears using FEA Package	CO4
14	Thermal modeling of worm gear	CO4
15	Stress visualization in worm gear system using FEA Package	CO5
16	Drafting of Bearing on Solid Modeling software.	CO5
17	Stress concentration in Ball Bearing.	CO5
18	Stress concentration in Roller Bearing.	CO5
19	Stress concentration in Needle Bearing.	CO5
20	Stress analysis in Gear, shaft and bearing assembly.	CO5

Required Software and Tools

1. Modelling Software
2. Analysis Software

Textbooks

S. No.	Book Details
1.	Design of Machine Element by V. B. Bhandari, TMH Publication.
2.	Design data handbook by V. B. Bhandari, TMH Publication.
3.	Machine Design by Robert L. Norton, Pearson Publication.

Reference Books

S. No.	Book Details
1.	Machine Design: An Integrated Approach by Robert L. Norton, Pearson Publication
2.	Mechanical Engineering Design by Joseph E. Shigley and Charles R. Mischke, TMH Publication
3.	Machine element in mechanical design by Robort L Mott, PHI

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)
School of Mechanical Engineering

Subject Name: Environmental Science **L-T-P [2-0-0]**

Subject Code: BNC0402 **Applicable in Department: All Branches**

Pre-requisite of Subject: 1. Environmental science is an interdisciplinary field that requires a solid foundation in various subjects to fully understand the complex interactions within the environment.

2. Building a strong foundation in subjects like physics, chemistry, biology, maths, geography, economics will equip students with the knowledge and skills necessary to tackle complex environmental challenges and contribute to sustainable solutions.

Course Objective: To help the students in realizing the inter-relationship between man and environment and help the students in acquiring basic knowledge about environment.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level (KL)**
CO1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids	K1, K1
CO2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation	K1, K2
CO3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K1, K2
CO4	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K1, K2
CO5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K1, K2

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping

1	Basic Principle of Ecology	Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Eco restoration	Smart board, PPTS, Reference Books,	4 L	NA	CO1
2	Natural Resources and Associated Problems	Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles. Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.	Smart board, PPTS, Reference Books,	4 L	NA	CO2
3	Biodiversity Succession and Non-Renewable Energy Resources	Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance. Succession: Concepts of	Smart board, PPTS, Reference Books	4 L	NA	CO3

		succession, Types of Succession. Trends in succession. Climax and stability.				
4	Pollution and Solid Waste Management	Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox,CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment, Climate change, global warming, acid rain, ozone layer depletion.	Smart board, PPTS, Reference Books	4 L	NA	CO4
5	Role of Community and Environmental Protection Acts	Role of community, women and NGOs in environmental protection, Bio indicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law.F. District Environmental Action Plan. Climate action plans.	Smart board, PPTS, Reference Books	4 L	NA	CO5
Total			**20 Hours**			

Textbooks

Sr No	Book Details
1	Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.
2	Botkin, D.B and Kodler E.A., 2000, Environmental Studies : The earth as a living planet. John Wiley and Sons Inc. Environmental studies and Environmental engineering –By Dr. H.H
3	Environmental Studies By Dr B.S.Chauhan

Reference Books	
Sr No	**Book Details**
1	Rao M.N. and H.V.N. Rao, 1989 : Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi
2	A Text Book of environmental Science By Shashi Chawla
3	Environmental studies- R, Rajagopalan -Oxford Pubtiotion20051
Links	
Unit 1	Ecosystems and Biomes | Classroom Learning Video - YouTube
Unit 2	Environmental Science EVS Unit 3 Natural Resources Land Resources AEC semester 1/2 DU SOL NCWEB P -1 (youtube.com)
Unit 3	'Biodiversity & its Conservation' In Just 24 Minutes□□| Ultimate Revision Series | Neet 2022 (youtube.com)
Unit 4	Air Pollution | What Causes Air Pollution? | The Dr Binocs Show | Kids Learning Videos Peekaboo Kidz (youtube.com)
Unit 5	Environmental Pollution - Environment and Ecology for UPSC IAS Part 2 (youtube.com)

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Artificial Intelligence and Cyber Ethics	**L-T-P [3-1-0]**
Subject Code: BNC0401	**Applicable in Department: ME**

Pre-requisite of Subject:
Basic understanding of computer systems and ethics.

Course Objective:
The course aims to foster critical thinking about ethical issues, promote responsible use of technology, and ensure students can identify, analyse, and address ethical dilemmas in AI and cyber domains.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO 1	Learn key principles of AI ethics, summarizing ethical considerations and applications in AI development and deployment.	K_2
CO 2	Apply policies and framework for Fairness in AI and Machine Learning.	K_3
CO3	Apply privacy and security concepts, risk management and regulatory compliance in the field of AI and Cyber Security.	K_3
CO 4	Understand the nature of cybercrimes, the principles of intellectual property rights (IPR), and the legal measures necessary to address and prevent these issues.	K_2
CO 5	Describe the impact of AI in Society, employment and workforce	K_2

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	An overview to AI Ethics	Definition of AI. Ethical principles in AI. Sources of AI data. Legal implications of AI security breaches, Privacy and AI regulations. Key Principles of responsible AI, transparency and accountability, Dual-use dilemma, Human-centric design. Introduction to Cyber Laws and Ethics, Historical development of cyber laws, Legal	Lecture and Case studies	5	Assignment-1	CO1

		frameworks				
2	Fairness and Favoritism in Machine Learning	Introduction to Fairness and Bias in AI, Types of Fairness and Bias. Impact of Bias and Fairness in AI, techniques for measuring Fairness and Bias. Techniques for mitigating bias. Current policies and frameworks for fairness in AI. Bias in data collection, Fairness in data processing. Generative AI, Types of Bias in Generative AI.	Lecture and Case studies	6	Assignment-2	CO2
3	AI Ethics and Cybersecurity Principles	Importance of privacy and security in AI, AI specific security tools and software, privacy-preserving machine learning (PPML) and privacy-preserving data mining (PPDM) Ethical considerations in phases of AI development life cycle, Risk management: Risk assessment and incident response Regulatory compliance: GDPR, HIPAA **Case studies:** Implementation of AI ethics guidelines and best practices in engineering projects, Ethical decision-making processes and tools for engineers working with AI technologies	Lecture and Case studies	8	Assignment-3	CO3
4	Cybercrimes, IPR and Legal Measures	Types of cybercrimes and their impact, Legal measures for cybercrime prevention and prosecution. IPR: Copyrights, trademarks, patents, and trade secrets, Ethical implications of intellectual property, Cyber security and privacy issues	Lecture and Case studies	5	Assignment-4	CO4
5	AI's Contribution to Social Evolution	Positive and negative political impacts of AI, Role of AI in social media and communication platforms, AI-generated content and deepfakes, Applications of AI in addressing global challenges, Key technical stakeholders in AI deployment: developers, researchers, policymakers, Technical Impacts on Employment and Workforce: Automation technologies: robotic process automation (RPA), autonomous systems	Lecture and Case studies	6	Assignment-5	CO5
			Total	**30**		

Textbooks	
S. No.	**Book Details**
1.	Introduction to Information Security and Cyber Laws, Simplified Chinese Edition by Surya Prakash Tripathi, Ritendra Goel,
2.	AI ETHICS: Paving the Path for Responsible Machine Learning, Shivanand Kumar
Reference Books	
S. No.	**Book Details**
1.	AI ETHICS (The MIT Press Essential Knowledge series), by Mark Coeckelbergh
2.	Computers, Internet and New Technology Laws by Karnika Seth – by Karnika
Links	

- https://www.youtube.com/watch?v=VqFqWIqOB1g
- https://www.youtube.com/watch?v=hVJqHgqF59A
- https://www.youtube.com/watch?v=O5RX_T4Tg24
- https://www.youtube.com/watch?v=RJZ0pxcZsSQ
- https://www.youtube.com/watch?v=I9FOswjTSGg

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
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School of Mechanical Engineering

Subject Name: Environmental Science	**L-T-P [2-0-0]**
Subject Code: BNC0402	**Applicable in Department: ME**

Pre-requisite of Subject:

Environmental science is an interdisciplinary field that requires a solid foundation in various subjects to fully understand the complex interactions within the environment.

Building a strong foundation in subjects like physics, chemistry, biology, maths, geography, economics will equip students with the knowledge and skills necessary to tackle complex environmental challenges and contribute to sustainable solutions.

Course Objective:

To help the students in realizing the inter-relationship between man and environment and help the students in acquiring basic knowledge about environment.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:		**Bloom's Knowledge Level**
CO 1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids	K_1
CO 2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation	K_2
CO3	Understand the importance of biodiversity, Threats of biodiversity and different methods of biodiversity conservation.	K_2
CO 4	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K_2
CO 5	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K_2

Syllabus

Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1	Basic Principle of Ecology	Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food webs. Ecological	Smart board, PPTS, Reference Books,	4	Assignment- 1	CO1

		pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Basic concepts of sustainable development, SDGs, Ecosystem services, UN Decade for Eco restoration				
2	Natural Resources and Associated Problems	Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles. Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages.	Smart board, PPTS, Reference Books,	4	Assignment- 2	CO2
3	Biodiversity Succession and Non-Renewable Energy Resources	Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance. Succession: Concepts of succession, Types of Succession. Trends in succession. Climax and stability.	Smart board, PPTS, Reference Books	4	Assignment- 3	CO3
4	Pollution and Solid Waste Management	Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, Cox,CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution:	Smart board, PPTS, Reference Books	4	Assignment- 4	CO4

		Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment, Climate change, global warming, acid rain, ozone layer depletion.				
5	Role of Community and Environmental Protection Acts	Role of community, women and NGOs in environmental protection, Bio indicators and their role, Natural hazards, Chemical accidents and disasters risk management, Environmental Impact Assessment (EIA), Salient features of following Acts: a. Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972.b. Water (Prevention and control of pollution) Act, 1974.c. Air (Prevention and control of pollution) Act, 1981. Forest (Conservation) Act, 1980.d. Wetlands (Conservation and Management) Rules, 2017; e. Chemical safety and Disaster Management law. F. District Environmental Action Plan. Climate action plans.	Smart board, PPTS, Reference Books	4	Assignment- 5	CO5
			Total	**20**		

Textbooks	
S. No.	**Book Details**
1.	Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York.
2.	Botkin, D.B and Kodler E.A., 2000, Environmental Studies: The earth as a living planet. John Wiley and Sons Inc.
3.	Environmental studies and Environmental engineering –By Dr. H.H
4.	Environmental Studies by Dr B.S. Chauhan

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3.	Environmental studies- R, Rajagopalan -Oxford Pubtiotion

Links

- Ecosystems and Biomes | Classroom Learning Video - YouTube
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- 'Biodiversity & its Conservation' In Just 24 Minutes| Ultimate Revision Series | Neet 2022 (youtube.com)
- Air Pollution | What Causes Air Pollution? | The Dr Binocs Show | Kids Learning Videos Peekaboo Kidz (youtube.com)
- Environmental Pollution - Environment and Ecology for UPSC IAS Part 2 (youtube.com)