NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)



Affiliated to

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



Evaluation Scheme & SyllabusFor

Bachelor of Technology Mechanical Engineering

Second Year

(Effective from the Session: 2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Bachelor of Technology Mechanical Engineering

Evaluation Scheme SEMESTER-III

Sl.	Subject	Subject	Types of Subjects	Perio	ods		Eva	luation S	Schemes		Enc Seme		Total	Credit
No.	Codes	•		L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSCC0301	Employability Skill Development - I	Mandatory	2	0	0	60	40	100				100	2
2	BASL0301N	Technical Communication	Mandatory	2	0	0	30	20	50		50		100	2
3		Engineering Mechanics & Strength of Materials	Mandatory	3	1	0	30	20	50		100		150	4
4	BME0305	Material Science	Mandatory	3	0	0	30	20	50		100		150	3
5	BME0306	Thermodynamics and Heat Transfer	Mandatory	3	0	0	30	20	50		100		150	3
6	BME0304	Manufacturing Science & Technology	Mandatory	3	0	0	30	20	50		100		150	3
7	BME0356	Thermodynamics and Heat Transfer Lab	Mandatory	0	0	2				25		25	50	1
8	BME0352	Computer Aided Modelling Lab	Mandatory	0	0	2				25		25	50	1
9		Strength of Materials & Material Characterization Lab	Mandatory	0	0	2				25		25	50	1
10	BME0355	Computer Aided Manufacturing	Mandatory	0	0	6				50		100	150	3
11	BME0359X	Social Internship	Mandatory	0	0	2				50			50	1
12		Environmental Science / Artificial Intelligence and Cyber Ethics	Compulsory Audit	2	0	0	30	20	50				50	NA
		*Massive Open Online Courses (For B.Tech. Hons. Degree)												
		TOTAL											1150	24

* List of MOOCs Based Recommended Courses for Second year (Semester-III) B. Tech Students

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0054	Advanced Writing	Infosys Wingspan (Infosys Springboard)	24 h 6 m	1.5
2	BMC0032	Cyber Security Foundation	Infosys Wingspan (Infosys Springboard)	11h 5m	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 BNC0301Y/BNC0302Y)
 - ➤ 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., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

Bachelor of Technology Mechanical Engineering

Evaluation Scheme SEMESTER-IV

Sl.	Subject Codes	Subject	Types of	I	Perio	ds]	Evalua	tion Schem	ies	End Semes		Total	Credit
No.			Subjects	L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BASCC0401	Employability Skill Development - II	Mandatory	2	0	0	60	40	100				100	2
2	BAS0405	Probability, Statistics and Complex Analysis	Mandatory	3	1	0	30	20	50		100		150	4
3	BME0403	Measurement and Metrology	Mandatory	3	0	0	30	20	50		100		150	3
4	BME0402	Computer Integrated Manufacturing	Mandatory	3	0	0	30	20	50		100		150	3
5	BME0404	Fluid Mechanics & Machines	Mandatory	3	0	0	30	20	50		100		150	3
6		Department Elective - I	Department Elective	3	0	0	30	20	50		100		150	3
7	BME0453	Measurement and Metrology Lab	Mandatory	0	0	2				25		25	50	1
8	BME0454	Fluid Mechanics & Machines Lab	Mandatory	0	0	2				25		25	50	1
9	BME0455	Machine Design and Application of FEA	Mandatory	0	0	6				50		100	150	3
10	BCSCC0452	Problem Solving Approaches	Mandatory	0	0	2				50			50	1
11	BME0459	Mini Project	Mandatory	0	0	2				50			50	1
12	BNC0402Y/ BNC0401Y	Environmental Science / Artificial Intelligence and Cyber Ethics	Compulsory Audit	2	0	0	30	20	50				50	NA
		*Massive Open Online Courses												
		Total											1200	25

* List of MOOCs Based Recommended Courses for Second year (Semester-IV) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0050	CATIA V5 - Computer Aided Design (CAD)	Infosys Wingspan (Infosys Springboard)	42h 30m	3.5
2	BMC0034	Finite Elements Analysis	Infosys Wingspan (Infosys Springboard)	9h 52 m	0.5
3	BMC0033	Introduction to AI	Infosys Wingspan (Infosys Springboard)	6h 18m	0.5

PLEASE NOTE: -

- A 3-4 weeks Internship shall be conducted during summer break after semester-IV and will be assessed during Semester-V
- Compulsory Audit (CA) Courses (Non-Credit BNC0401Y/BNC0402Y)
 - ➤ 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., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

List of Departmental Electives

Sl. No.	Subject Codes	Subject Name	Types of Subjects	Bucket Name	Branch	Semester
1	BME0412	Factory Automation	Department Elective - I	Industry 4.0(Robotics and Automation)	ME	IV
2	BME0411	Automotive Engineering	Department Elective - I	Automotive Engineering	ME	IV
3	BME0413	Operations Management	Department Elective - I	Supply Chain Management	ME	IV

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

A student will be eligible to get Under Graduate degree with Honor's 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 to 18 = 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 Honours 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



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code:	BCSCC)301							ne: Em	ployabili	ity	L	T	P	C
							Skil		₁4 T						
Course Offered in: B.Tech. Second Year Sem-III ME Pre-requisite: Programming Language C												2	0	0	2
					TIT IVIL								U		
Course Objec	tives: Thi	is course	introdu	ces com											
principles. It e															
	develop problem-solving abilities and teamwork while creating real-world applications, mini-games, and simulations, enhancing both technical and collaborative competencies														
Course Outcome: After completion of the course, the student will be able to Bloom's Knowled												ledge L	evel (K	L)	
CO1			ply sets,						oblem-so	olving			K3		,
Understand and implement the steps in the software development												К3			
life cycle using logical reasoning and flowcharts. Design and develop small-scale software projects or games using															
CO3		approach		using			K6								
			llaborate							te					
cO4 software project, demonstrating problem-solving a													K6		
communication skills. CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
	nng (Scar	e 1: Low	V, 2: IVIE	urum, 5	: migii)							T			
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSC)2	PSO3
CO1	3	3	2	2				2							
CO2	3	3	3	2				2							
CO3	3	3	3	2				2							
CO4	3	3	3	3				2							
Course Conte	nts / Sylla	abus													
Module 1										Concept				ours	
Computer Sys Mathematical															
Induction and			Comp	uung.	ocis, Re	iations,	and Tui	ictions.	deminic	nis and a	ррпсано	115, 111110	ipic oi	wanic	maticai
Module 2			Softwar	e Devel	opment	Fundan	nentals						81	ours	
Introduction to								on to sir	nple pro	blems, D	evelopin	g logic/f	lowcha	t/pseuc	locode,
simple games,	puzzles, S						traction								
Module 3	4 1 1		Project					.1 1		1 . 1	1			ours	
Introduction to using loops an															
implement sim															
is introduced b															
files. Module 4] -	Project/	Como I	Javalan	mont							QI	ours	
Project Plannir	ng & Deve						velop C	++ game	e or simu	ılation), N	Mini Proi	ect, Proie			on and
Review		*					1								
Touther										T	otal Lect	ure Hou	ırs 40	hours	
Textbook: S.No		D^	ak Titla	with m	ıhliootic	n ogora	N & TO	ar .		Antho	.r				
Reference Bo	noks:	р0	ok Title	with bi	ioncau(m ageno	y & yea	a1.		Autho) <u>1</u>				
S.No	, J. N. J.	Ro	ok Title	with n	ıblicatio	n agend	y & ve	ar		Autho	r				
1			Project-I								ess Point Publishing				
2			ogrammi								Stroustr				
3			fective N								Meyers	1			
											J =				



(An Autonomous Institute)
School of Mechanical Engineering

<u>TA* - T</u>	<u>'eacher Ass</u>	<u>essment marl</u>	ks on the bas	is of defined	d Teaching	Methodolog	gies like
Quiz, A	ssignment,	Video Assign	ment, Semir	ar, Group o	discussion,	PBL or any	other
defined	by respecti	ve faculty me	mbers and i	nav varv to	subject-wi	se and facul	ltv-wise



(An Autonomous Institute) School of Mechanical Engineering

Course Code: BASL0301N	Course Name: Technical Communication	L	T	P	С
Course Offered in: B.Tech. Second Year Sem-III ME		2	0	0	2

Pre-requisite: Intermediate level (CEFR) and above

Course Objectives: Demonstrate effective verbal and non-verbal communication skills in diverse professional settings, including meetings, presentations, and interpersonal interactions.

- 2. Develop and apply clear, concise, and audience-appropriate written communication, such as emails, letters, memos, resume', using correct grammar, tone, and format.
- 3. Adapt communication style based on cultural, organizational, and situational contexts to foster inclusive and respectful professional relationships.
- 4. Employ digital communication tools and platforms (e.g., video conferencing, business messaging apps) responsibly and effectively in remote or hybrid work environments.

Course O	utcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1	Comprehend the principles and functions of technical communication	K3
CO2	Write for specific audience and purpose to fulfil the provided brief	K3
CO3	Recognize and produce different kinds of technical documents.	K3
CO4	Apply effective speaking skills to efficiently carry out official discourses.	K3
CO5	Demonstrate their understanding of communication through digital media.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	2	1	1	2	3	1			
CO2	1	1	1	1	1	1	1	1	2	3	1			
CO3	1	1	1	1	1	1	1	1	2	3	1			
CO4	1	1	1	1	1	1	1	1	2	3	1			
CO5	1	1	1	1	1	1	1	1	2	3	1			

Course	Contents / Syllabus	
Course	Comenis / Synabus	

8 hours

Technical Communication: Definition, Process, Types, Levels, and Flow; Barriers to Technical Communication: emphasis on gender neutral language and cultural sensitivity; Significance of audience in technical communication

Module 2 Technical Writing 1

8 hours

Technical writing skill: characteristics, examples; Business letters/emails: Content organization, Tone and intent; Agenda & Minutes of Meetings

Module 3	Technical Writing 2	8 hours
Job application.	, Resume'; Report, proposal; Technical paper: Abstract; Ethical Writing: Copy Editing, Referencing and I	Plagiarism
Module 4	Public Speaking	8 hours

Components of effective speaking: Simplicity, order, balance in arranging ideas. Importance of KOPPACT; Appearing for a job interview: FAOs; Telephonic & Online Interviews

Module 5 Virtual/Remote Communication 8

8 hours

Remote work: online platforms; Video conferencing; Virtual etiquette: email ids, usernames; Writing Blogs & creating Vlogs

Total Lecture Hours | 40 hours

Textbook:

S.No	Book Title with publication agency & year	Author
1	1. Technical Communication – Principles and Practices, 4th Edition by	Meenakshi Raman & Sangeeta Sharma
	Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2022, New Delhi.	_

Reference Books:

S.N o	Book Title with publication agency & year	Author
1	Technical Communication, 15th Edition, Pearson, 2021.	John M. Lannon & Laura J. Gurak
2	Spoken English- A Manual of Speech and Phonetics (5th Edition) Orient Blackswan,	by R K Bansal & J B Harrison



(An Autonomous Institute)
School of Mechanical Engineering

	2024, New Delhi.							
3	Business Correspondence and Report Writing (6th Edition), Tata McGraw Hill & Co. Ltd., 2020, New Delhi.	by Prof. R C Sharma, Krishna Mohan, and Virendra Singh Nirban						
4	Intercultural Communication in Virtual Exchange Press, 2024. Francesca Helm, Cambridge Univ							
NPT	EL/ Youtube/ Faculty Video Link:							
1	Unit 1 https://onlinecourses.nptel.ac.in/noc24 ge37/preview							
2	Unit 2 https://archive.nptel.ac.in/courses/109/106/109106094/							
3	Unit 3 https://www.youtube.com/watch?v=kOJlwMJxEG0&t=8s							
4	Unit 4 https://www.youtube.com/watch?v=Sg7Q_dC_fWU&list=PLPuC5CMHiqmu	zq_KQ4aw0V9Q7xJY6aezb						
5	Unit 5 https://www.youtube.com/watch?v=ymLFJDpjgCk&list=PLPuC5CMHiqmuz	cq_KQ4aw0V9Q7xJY6aezb&index=6						

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BME0301N	Course Name: Engineering Mechanics & Strength of Materials	L	T	P	С				
Course Offered in: B.Tech. Second	3	1	0	4					
Pre-requisite: Engineering Mathematics I & II and Physics.									
Course Objectives: This course ain	Course Objectives: This course aims to provide a foundational understanding of the mechanics of deformable bodies. It introduces the								

Course Objectives: This course aims to provide a foundational understanding of the mechanics of deformable bodies. It introduces the analysis of force systems and equilibrium in two dimensions, followed by the study of stress-strain relationships under various loading conditions. The course focuses on the analysis of beams for shear force, bending moment, slope, and deflection, and extends to torsion in circular shafts and buckling of columns. It also covers the behavior of thin and thick-walled cylinders under internal and external pressures, enabling students to apply mechanical principles to practical engineering problems.

Course Outcome: After completion of the course, the student will be able to Bloom's Knowledge Level (KL) Understand the concept of force systems and apply the force equilibrium condition to solve various CO₁ K4 two-dimensional problems. Understand the concept of stress and strains and apply concept of principle stress and strains CO₂ K4 stress and strain under different loading conditions. Analyze the beams and determine stresses, slope, and deflection of the transversely loaded **CO3** K3 members To understand the basic concept and analysis of shaft subjected to torsion and apply the **CO4** K4 concepts of stresses and strain in solving problems buckling of columns. Understand the concept of thin and thick cylinders and apply the concepts of stresses and strain in **CO5** K4 solving problems related to thin and thick cylinders.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	3	3	2	1						1	1	3	2	
CO2	3	3	2	1						1		3	2	
CO3	3	3	2	1						1	1	3	2	
CO4	3	3	2	1						1	1	3	2	
CO5	3	3	2	1						1		3	2	

Course Contents / Syllabus

Module 1 Force system & Truss Analysis 8 hours

Overview of force system: Review of two-dimensional force systems, free body diagram, 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.

Module 2 Simple, Compound and Principal Stresses 8 hours

Simple stress and strains: Introduction to simple stress, strain, shear stress, hooks law, elastic constants, numerical problems on hooks law, thermal stresses, strain energy.

Principle stress and strain stress on inclines sections, state of plane stress, principal stress and strain, maximum shear stress, Mohr's circle for plane stress.

Module 3 Beams 8 hours

Beam: Introduction, shear force and bending moment, different equations of equilibrium, shear force and bending moment diagram for statically determined 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.

Module 4	Torsion and Column analysis	8 hours
----------	-----------------------------	---------



(An Autonomous Institute)
School of Mechanical Engineering

Torsion: combined bending and torsion of solid and hollow shafts, torsion of thin-walled tubes.

Stability of columns: 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, Ranking Gordon formulae.

Module 5	5 Cylinders & Spheres	8	8 hours				
cylinders	inders & spheres: Introduction, difference between thin-walled and hoop and axial stresses and strain, and volumetric strain. linders: Radial, axial, and circumferential stresses in thick cylinders.		eres and				
		Total Lecture Hours 4	0 hours				
Textbook S.No		Author					
1	Book Title with publication agency & year Strength of materials	R. K. Rajput					
2	Strength of Materials Strength of Materials	R. K. Bansal					
3	Engineering Mechanics	Nelson					
Refe	rence Books:						
S.No	Book Title with publication agency & year	Author					
1	Introduction to Solid Mechanics	Shames					
2	Mechanics of Material	Gere					
3	Mechanics of Materials	Beer, Johnston					
NPTEL/	Youtube/ Faculty Video Link:						
Module 1	NPTEL :: Mechanical Engineering - NOC:Engineering Mech	anics					
Module 2							
Module 3	NPTEL :: Mechanical Engineering - Strength of Materials						
Module 4	NPTEL :: Mechanical Engineering - Strength of Materials						

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BME0305 Course Name: Material Science		L	T	P	С
Course Offered in: B.Tech. Second Year S	em-III ME	3	0	0	3

Pre-requisite: NA

Course Objectives: 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	Outcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1	Analyze the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy.	K4
CO2	Understand and apply heat treatment techniques, TTT diagrams, and diffusion principles for material properties.	K4
CO3	Interpret features, classification, applications of newer class materials like smart materials, piezoelectric materials, biomaterials, composite materials etc.	К3
CO4	Understand the fundamentals of composite and its applications.	K4
CO5	Interpret Materials characterization and Metallographic techniques such as X-Ray diffraction, scanning electron microscopy.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	3	2	-	-							1	3		1
CO2	3	3	2	2	2						2	3	2	1
CO3	2	1	2		2	1	2				2	2	3	3
CO4	2	1	3		2	1	2				2	2	2	2
CO5	3	2		3	3						2	3	3	2

Course Contents / Syllabus

Module 1 Properties of Materials & Phase Diagram 8 hours

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.

Phase Diagram: 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.

Module 2 Heat Treatment and Diffusion 8 hours

Heat treatment: Various types of heat treatments such as Annealing, Normalizing, Quenching, Tempering (Austempering, 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.

Module 3 Smart and Advanced Materials 8 hours

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.



(An Autonomous Institute)
School of Mechanical Engineering

Module											
_		Composite, classification of composites, Applicati	on of composite, Types of matrix and								
		nethods of composite materials.									
Module	5	Material characterization and Metallography	y	8 hours							
transmis	sion electron micro	and Metallographic techniques: X-Ray diffractions ascopy, atomic force microscopy, scanning tunnus scanning calorimetry. Introduction to NDT and variables	nelling microscopy, atomic absorption								
			Total Lecture Hours	40 hours							
Textboo			T								
S.No		publication agency & year	Author								
1	Materials Science	and Engineering	William D., Jr. Callister and D Rethwisch	Pavid G.							
2	A Textbook of M	R. K. Rajput									
3	Introduction to M	aterial Science for Engineers	F. Shackelford								
Refe	erence Books:										
S.No	Book Title with	Book Title with publication agency & year Author									
1	Experiments in M	Interials Science and Engineering	Tariq A. Khraishi and Marwar Al-Haik	ı S.							
2	Materials Science	and Engineering: A First Course	V. Raghavan								
3	Fundamentals of	Metal Cutting and Machine Tools	B. L. Juneja Sekhon								
NPTEL/	Youtube/ Faculty Vi	deo Link:									
Module	1 NPTEL :: Me Engineering	tallurgy and Material Science - NOC:Introduction to	Materials Science and								
Module	2 <u>NPTEL</u> :: Me	tallurgy and Material Science - NOC:Heat Treatment	t and Surface Hardening - I								
	NPTEL :: Me	tallurgy and Material Science - Phase Transformatio	ns and Heat Treatment								
Module	3 NPTEL :: Me	tallurgy and Material Science - NOC: Advanced Mate	erials and Processes								
	NPTEL :: Me	chanical Engineering - NOC:Smart Materials and In-	telligent System Design								
Module	4 NPTEL :: Me	chanical Engineering - NOC:Introduction To Compo	<u>sites</u>								
	NPTEL :: Me	chanical Engineering - NOC:Manufacturing of Com	posites								
Module	5 NPTEL :: Me	tallurgy and Material Science - NOC:Material Chara	acterization								
			-								

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



Course Code: BME0306

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Name: Thermodynamics and Heat Transfer

Course	Offered	l in: B.Te	ch. Seco	nd Year	Sem-II	I ME							3 0	0	3	
Pre-req	uisite: l	Basic Kno	owledge	of Phy	sics and	l Mather	matics									
	-	ves: To p				•			_	•	•			•		
-	-	ons in en	-	-			_					_	_		out the	
		Fin in Au														
		ow to mi							applicat	tion of h	eat exch	anger in				
Course		ne: After o											Bloom's Level (F	s Knowled (L)	ge	
CO1	2 nd la	onstrate tl ws of the	rmodyn	amics.		-							K3			
CO2	prope	yze and a erties of p	ure subs	stances.										K4		
CO3	its in	onstrate tl dustrial aj	oplicatio	ons.				•						К3		
CO4	heat transfer with its application to industry.													K4		
CO5	Design and analyze heat exchangers and different industrial applications of thermodynamics. -PO Mapping (Scale 1: Low, 2: Medium, 3: High)													K4		
CO-PO	Mappi	ng (Scale	1: Low,	2: Medi	um, 3: I	High)		T			•		•	1		
CO-PO Mappi		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO:	
CO1		3	2	2	1	1	1	1	1	1	1	1	2	1		
CO2		3	3	2	2	1	1	1	1	2	1	1	2	1		
CO3		3	3	2	2	1	1	1	1	1	1	1	2	1		
CO4		3	3	2	2	1	1	1	1	2	1	1	2	1		
CO5		3	3	2	2	1	1	1	1	1	1	1	2	1		
		ts / Syllab			4		- C 41		•					8 hours		
Module		ts: Conce						modyna						8 nours		
First la -I. SFE Second	nw of th E and i l law o	thermodynermodynes applica f thermodynecond lav	namics: tions. odynan	First la	w analy	of Hea	open and t engin	d closed es, Hea	system, t pump	Limitat	ions of fi	rst law o	f thermo	dynamics	s, PMN	
Module 2 Principles of entropy, availability, and properties of pure substances										ıre	8 hours					
process	ses. Proj	usius ine perties of	steam a	nd Ranl	kine cyc	ele: Prop	erty of	Pure Sub	stance(steam),	Saturatio	n states,				
Supern Module		apour stat				n proce			1111 - 1 ab	ies & IV	iomer ch	art.		8 hours		
Modes	of Hea	t Transfo General	er: Condiffere	duction ential h	, convec	ction and	d radiati n equati	on. on in th			cylindri	ical coo	rdinate s	I	Steady	

State One-dimensional Heat conduction: Simple and Composite Systems in rectangular, cylindrical



(An Autonomous Institute)
School of Mechanical Engineering

coordinate. Thermal resistance, Critical radius of insulation Transient Conduction: Transient heat conduction; Lumped capacitance method; Time constant; Unsteady state heat conduction in one dimension only. Fins of

uniform cross-sectional area;

Module 4 Convection and Radiation heat transfer 8 hours

Forced Convection: Basic concepts; Hydrodynamic boundary layer; Thermal boundary layer;

Natural Convection: Physical mechanism of natural convection; Buoyant force; Empirical heat transfer relations for natural convection Basic radiation concepts; Radiation properties of surfaces; 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, Condensation and Boiling.

Module 5 Applications of thermodynamics and heat transfer 8 hours

Heat Exchangers: Types of heat exchangers; Fouling factors; Overall heat transfer coefficient; Logarithmic mean temperature difference (LMTD) method; Effectiveness-NTU method.

Boilers: Classifications and working of boilers, boilers mountings and accessories.

Condenser: Classification of condenser, air leakage. Steam and Gas Nozzles, Steam Turbines: Classification of steam turbine.

		Total Lecture Hours 40 hours						
Textbook	k:							
S.No	Book Title with publication agency & year	Author						
1	Engineering Thermodynamics	P.K. Nag						
2	Thermodynamics: An Engineering Approach by Michael	Michael A. Boles and Yunus A Çengel						
3	Heat and Mass Transfer	Yunus A Çengel						
4	A Textbook on Heat Transfer	S.P.Sukhatme						
5	Heat and Mass Transfer	R K Rajput						
Refe	erence Books:							
S.No	Book Title with publication agency & year	Author						
1	Fundamentals of Engineering Thermodynamics	Moran M. J. & Shapiro H. N.						
2	Fundamentals of Heat and Mass Transfer	Incroperra & DeWitt						
3	Heat Transfer by J.P. Holman	J.P. Holman						
NPTEL/	Youtube/ Faculty Video Link:							
Module	https://nptel.ac.in/courses/101104063							
Module 2	https://nptel.ac.in/courses/112106419							
Module 3	3 https://nptel.ac.in/courses/112101002							
Module 4	https://nptel.ac.in/courses/112101097							
Module :	https://nptel.ac.in/courses/112107256							

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BME0304	Course Name: Manufacturing Science and Technology	L	T	P	C
Course Offered in: B.Tech. Second Year Sem	-III ME	3	0	0	3

Pre-requisite: Digital Manufacturing

Course Objectives: 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	Course Outcome: After completion of the course, the student will be able to							
CO1	Understand the concept of manufacturing processes, solve the problems based on casting.	Level (KL) K3						
CO2	Analyze & solve the problems based on Metal forming processes & understand the concept of powder metallurgy.	K4						
CO3	Understand the concept of metal joining processes.	K2						
CO4	Analyze the conventional machining processes.	K3						
CO5	To analyze the non-traditional machining process & the Abrasive finishing processes.	K3						

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	3	1	1	1	1	1	2	3	2	
CO2	3	3	2	2	3	1	1	2	1	2	2	3	2	
CO3	2	2	1	1	3	1	1	1	1	1	3	3	2	
CO4	3	3	2	2	3	1	1	1	1	1	2	3	2	
CO5	3	3	2	3	3	1	1	2	2	2	3	3	2	

Course Contents / Syllabus

Module 1 Casting & Special Casting Processes

8 hours

Gating and Riser Design for Casting: Elements of Gating System, Types of Gates and gating systems. Pouring time calculations, Top 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: CO2 Moulding, Shell Moulding, Investment Casting, Die Casting, Hot and Cold Chamber Processes;

 $Centrifugal\ casting; Continuous\ Casting\ Defects-Types,\ Causes\ and\ Remedies.$

Module 2 Metal Forming Processes & Sheet Metal Forming 8 hours

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.

Module 3 Metal Joining Processes 8 hours

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



Module 6

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

typical grain structure, Welding defects. Terminology. Welding Symbols, WPS (Welding Procedure Specifications), PQR (Procedure Qualification Record). Module 4 8 hours **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 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. Module 5 8 hours **Unconventional Machining** Introduction and Classification of Un-Conventional Machining, Analysis of Un-Conventional Machining: ECM, EDM, USM, LBM and Water and Abrasive Jet Machining. Total Lecture Hours 40 hours Textbook: S.No Book Title with publication agency & year Author 1 A Textbook of Manufacturing Technology R. K. Rajput 2 A Textbook of Production Technology P.C. Sharma 3 Manufacturing Technology D. K. Singh 4 Manufacturing Technology - I Anup Goel **Reference Books:** Book Title with publication agency & year S.No Author 1 Manufacturing Technology: Materials, Processes, and Helmi A. Youssef, Hassan A. El-Equipment Hofy, Mahmoud H. Ahmed 2 Advanced Manufacturing Technologies Stephen F. Krar, Arthur Gill 3 Manufacturing Technology II Dr. R. Kesavan, B. Vijaya Ramnath 4 Ghosh, A. K. Mallik Manufacturing Science NPTEL/ Youtube/ Faculty Video Link: Module 1 Mechanical Engineering -NOC: Fundamentals of manufacturing processes Module 2 Manufacturing Process Technology I & II - Course (nptel.ac.in) Module 3 Mechanical Engineering - NOC: Fundamental of Welding Science and Technology Module 4 Mechanical Engineering - NOC: Mechanics of Machining Module 5 Mechanical Engineering - Advanced Machining Processes

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise

Mechanical Engineering - NOC: Non-Traditional Abrasive Machining Processes- Ultrasonic,

Abrasive Jet and Abrasive Water Jet Machining



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Course Code: BME0356	LAB Course Name: Thermodynamics and Heat Transfer Lab	L	T	P	С
Course Offered in: B.Tech. Second Ye	0	0	2	1	

Pre-requisite: Engineering Mathematics

Course Objectives: To provide practical experience in measuring and analysing 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 Ou	tcome: After completion of the course, the student will be able to	Bloom's Knowledge
		Level (KL)
CO1	Demonstrate and calculate the heat transfer rate through conduction.	K3
CO2	Demonstrate and calculate the heat transfer rate through convection.	K3
CO3	Demonstrate and calculate the heat transfer rate through radiation, and heat exchanger	K3
	units.	
CO4	Demonstrate and calculate the performance of petrol and diesel engine.	K3
CO5	Demonstrate the complete working of boiler and compounding of turbines.	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	3	3	1	1	1	1	1	1	2	1	3	3	2	
CO2	3	3	1	1	1	1	1	2	1	1	3	3	3	
СОЗ	3	3	1	1	1	1	1	1	1	1	2	3	2	
CO4	3	3	1	1	1	1	1	2	2	1	2	2	2	
CO5	3	3	1	1	1	1	1	1	1	1	2	2	2	

List Of Practical's (Indicative & Not Limited To)

- 1. Conduction Heat transfer analysis of Composite plane wall
- 2. Conduction Heat transfer analysis of Composite cylinder wall
- 3. Conduction Heat transfer analysis of Transient heat conduction
- 4. Conduction Determination of Thermal conductivity of insulating slab
- 5. Conduction Determination of Thermal conductivity of insulating powder
- 6. Convection –Performance analysis of Pool boiling.
- 7. Convection Experiment on heat transfer through Pin fin
- 8. Convection Heat Pipe experiment.
- 9. Radiation- Determination of Stefan-Boltzmann constant
- 10. Radiation- Determination of Emissivity of a plate
- 11. Heat exchanger Performance analysis of Parallel and Counter flow heat exchanger.
- 12. Heat exchanger Performance analysis of Plate type heat exchanger.
- 13. Study of two stroke Petrol Engine and Diesel Engine
- 14. Study of four stroke Petrol Engine and Diesel Engine
- 15. To study boilers and their accessories and mountings.
- 16. To study various types of compounding of turbine.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Course Code: BME0352	LAB Course Name: Computer Aided Modelling Lab	L	T	P	С
Course Offered in: B.Tech. Second Year S	0	0	2	1	

Pre-requisite: CAD and Digital Manufacturing.

Course Objectives: 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.

woria e	ngineering and design challenges.				
Course	Outcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)			
CO1	Apply basic concepts and methods from design engineering to explore creative solutions of real-world problems	K2			
CO2	Create parts, assemblies, flexible & sheet metal modelling, diagram complex systems and detailed engineering concept drawings.	K2			
CO3	Apply industry standards in the sketching, 3D modelling, validation and visualization of the products & assemblies.	K2			

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	2	1	3	2	2	1	2	1	2	2	1	1	1	1
CO2	2	2	3	2	3	2	1	1	2	2	2	1	1	1
CO3	2	2	3	2	3	2	1	1	2	2	2	1	1	1

List Of Practical's (Indicative & Not Limited To)

- 1. To draw polygons using a modeling software
- 2. To draw isometric projections of a given solid using modeling software.
- 3. Modeling of simple machine components (bracket, flange, nut, and bolt).
- 4. Modeling of carburetor parts I: body and plate
- 5. Modeling of carburetor parts II: shaft, arm, and cover
- 6. Modeling of I.C. engine components I: connecting rod and cylinder block
- 7. Modeling of I.C. engine components II: piston and crankshaft
- 8. To assemble pre modelled carburetor parts that are body, plate, shaft, arm, and cover in a CAD software
- 9. To assemble pre modelled internal combustion engine components that are connecting rod, cylinder block, piston, and crankshaft in a CAD software
- 10. To place a punch and die form on a Sheetmetal using CAD software.
- 11. To model a structural component using welding in CAD software
- 12. To model and force simulation of a structural component.
- 13. Flow simulation of a fan using CAD software.
- 14. To create a drawing with different views of a 3D modeled component



(An Autonomous Institute) School of Mechanical Engineering

LAB Course Code: BME0351	LAB Course Name: Strength of Materials & Material	L	T	P	С
	Characterization Lab				
Course Offered in: B.Tech. Second Year S	0	0	2	1	

Pre-requisite:

Course Objectives:

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, analyses 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	Outcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1	Understand and observe the microstructural study of different materials.	K2
CO2	Observe the effect of heat treatment effect on mechanical properties of metallic specimens.	K2
CO3	Determine the tensile, compressive, shear, flexural, torsional and fatigue strength of metallic.	К3
CO4	Determine the different types of hardness of metallic specimens.	К3
CO5	Observe the effect of impact and corrosion behavior on metallic specimen.	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

					0 ,									
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	2	1	-	-	-	-	2	2	2	
CO2	3	3	2	2	2	2	-	-	-	-	2	2	2	
СОЗ	3	3	3	3	3	2	-	2	2	2	2	2	2	
CO4	3	3	2	2	3	2	-	2	2	2	2	2	2	
CO5	3	3	2	2	3	3	2	2	2	2	3	2	2	

List Of Practical's (Indicative & Not Limited To)

- 1. To determine the microstructures of a prepared specimen using optical microscope.
- 2. Comparative study of microstructures of different specimens of different materials (mild steel, Gray C.I., brass, copper etc.)
- 3. To Study of heat treatment processes such as annealing, normalizing, quenching, and comparison of properties before and after heat treatment.
- 4. To determine the tensile strength of metallic specimen on universal testing machine.
- 5. To determine the tensile strength of polymer specimen on universal testing machine.
- 6. To determine the compressive strength of metallic specimen on universal testing machine.
- 7. To determine the shear strength of metallic specimen on universal testing machine.
- 8. To determine the flexural strength (3-point bending) of metallic specimen on universal testing machine.
- 9. To determine of torsional strength of a metallic specimen using the torsion testing machine.
- 10. To determine of fatigue strength of a metallic specimen.
- 11. To determine the Brinell hardness of materials using hardness testing machine.
- 12. To determine the Rockwell hardness of materials using hardness testing machine.
- 13. To Determine the Charpy impact strength of a metallic specimen using impact testing machine.
- 14. To Determine the Izod impact strength of a metallic specimen using impact testing machine.
- 15. To study the corrosion and its effects on metallic specimen.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Cours	se Code: BME0355	LAB Course Name: Computer Aided Manufacturing	L	T	P	C
Course Off	0	0	6	3		
Pre-requisit	te:		•			
	aims to elucidate conventional and n ng processes	nodern manufacturing processes and to make components by usi	ng diffe	erent		
Course Out	Bloom's Knowled					
			Le	evel	(KL)	
CO1	Demonstrate different Castin	g and forming operation and make components.				
CO2 Demonstrate traditional and computer-controlled machining process to make a component as per the drawing						
CO3			K2			
CO4	Demonstrate different types of	of surface finishing processes.			K2	
CO5	Demonstrate modern manufa	acturing processes and make a component as per drawing.			K2	

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-I O Ma	pping (Beare	1. 2011, 2.	Miculuii	1, 5. 11	·S···)										
	CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
	CO1	3	2	2	2	3	1	1	2	2	1	2	3	1	3
	CO2	3	2	2	2	3	1	1	2	2	2	3	3	1	2
	CO3	3	2	2	2	3	1	2	2	2	1	2	3	1	3
	CO4	3	2	2	2	3	1	1	2	2	1	2	3	1	2
	CO5	3	3	3	2	3	2	1	2	2	2	3	3	1	3

List Of Practical's (Indicative & Not Limited To)

Hands-on practice on casting process

- 1.1 Pattern Making by wood working lathe
- 1.2 Gatting System: Mould making, Position of riser, runner,
- 1.3 Casting: Melting of metal in furnace, pouring of molten metal
- 1.4. Identification of different casting defects

Hands-on practice on metal forming processes

- 2.1 Flattening: Use a mallet or a hammer to flatten a sheet metal surface that has become warped or distorted.
- 2.2 Make a nail using forging process.
- 2.3 Make a ring using forging process.
- 2.4 Curling: Use a curling tool or pliers to curl the edge of a sheet metal strip or panel.
- 2.5 Embossing: Use embossing dies or stamps to create raised designs or patterns on a sheet metal surface.
- 2.6 Stamping: Use metal stamps and a hammer to stamp letters, numbers, or designs onto a sheet metal surface.
- 2.7. Piercing: Use a hole punch or drill to create holes of various sizes and shapes in a sheet metal panel
- 2.8. Examine the influence of heat treatment on the mechanical properties of cold-formed components

Hands-on practice on sheet metal forming

- 3.1 Analyze the impact of varying blank holding forces on the formability of deep-drawn sheet metal components.
- 3.2 Study the effect of different lubrication methods on the quality of stretch-formed sheet metal parts.
- 3.3 Investigate the influence of process parameters on the dimensional accuracy in incremental sheet forming.
- 3.4 Examine the effect of different tool geometries on the wrinkling behavior in sheet metal hydroforming.
- 3.5 Edge Forming: Use pliers or a forming tool to create various edge shapes, such as flared, curled, or chamfered edges
- 3.6 Planishing: Use a planishing hammer or a hammer and dolly to smooth out imperfections or surface irregularities on a sheet metal panel.



(An Autonomous Institute)
School of Mechanical Engineering

3.7 To make a component using Injection Mounding

Hands-on practice on metal cutting processes (Lathe Machine Tools)

4.1 To Perform Plane Turning, Taper Turning, Threading, Grooving, Knurling Chamfering and make a component.

Hands-on practice on metal cutting processes (Drilling Machine Tools)

5.1 Make a hole at different locations using radial drill machine.

Hands-on practice on metal cutting processes (Milling Machine Tools)

- 6.1 Cut gear teeth on horizontal milling machine through plane indexing method.
- 6.2 Cut a keyway on vertical milling machine.

Hands-on practice on metal cutting processes (CNC Machine)

- 7.1 To write a part program for Perform Plane facing, Turning, Taper Turning and Threading operations and make a component
- 7.2 V-Carving: Use a CNC Router with a V-bit to create decorative V-shaped grooves or carvings on a material.
- 7.3 Engraving: Use a CNC router to engrave text or designs onto a surface, such as wood or acrylic
- 7.4 Pocketing: Use a CNC machine to create pockets or recesses in a material, suitable for fitting objects like screws or nuts
- 7.5 Drilling: Use a CNC machine to drill precise holes in a material at specific locations and depths.

Hands-on practice on metal joining processes and Grinding processes

- 8.1 To make a Butt, Lap, T Joint by using gas and ARC welding Process
- 8.2 To make a component by using spot welding
- 8.3 To make a component by using TIG and MIG welding
- 8.4 Polishing: Use abrasive compounds or polishing wheels to achieve a smooth and reflective surface finish on a workpiece
- 8.5 To make a single point cutting tool on tool grinder.
- 8.6 Study of the effect of grinding wheel conditioning techniques (e.g., dressing, truing) on grinding performance and wheel life
- 8.7 Material Removal Rate Analysis: Determine the material removal rate achieved by different abrasive machining processes under various parameters.

Hands-on practice on un-conventional machining processes

- 9.1 LASER Machining: make a hole in non-conducting materials
- 9.2 ECM Taper Cutting: Explore the capabilities of ECM for cutting tapered features or workpieces with angled profiles

10. Hands-on practice on 3D printing (Rapid Prototyping)

- 10.1 Keychain or Key Holder: Design and print a personalized keychain or key holder to showcase the capabilities of 3D printing
- 10.2 Phone Stand: Print a phone stand to hold your smartphone in a convenient viewing position
- 10.3 Plant Pot: Print a small plant pot to hold a succulent or small indoor plant.
- 10.4 Pencil Holder: Design and print a pencil holder to keep your desk tidy.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BNC0302Y	Course Name: Environmental Science	L	T	P	С
Course Offered in: B.Tech. Second Year Sem-III ME		2	0	0	2

Pre-requisite: Basic knowledge of biology, chemistry, ecology, geology, mathematics, and understanding of human impacts on natural systems.

Course Objectives: After completion of the course, the student will be able to

understand ecosystems, promote sustainability, address environmental issues, conserve biodiversity, and ensure responsible use of natural resources for future generations.

	· · · · · · · · · · · · · · · · · · ·	
Cours	e Outcome: After completion of the course, the student 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, biodiversity.	К2
CO2	Understand the different types of natural recourses like food, forest, Minerals and energy and their conservation.	K2
CO3	Understand the different types of pollution, pollutants, their sources, effects and their control methods.	K2
CO4	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	3	3	2						
CO2	3	3	2	2	1	3	3	2						
CO3	3	3	2	2	1	3	3	3						
CO4	3	3	2	2	1	3	3	2						

Course Contents / Syllabus

Module 1 Basic Principle of Ecology and Biodiversity

4 hours

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. 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.

Module 2 Natural Resources and Ecological succession

4 hours

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, and 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. Ecological succession-Types, stages, examples of ecological succession

Module 3 | Pollution and Waste Management

4 hours

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, Introduction to E-Waste, Types and classification of E-Waste, Impacts of E-Waste on environment and human health, E-Waste management and recycling., Climate change, global warming, acid rain, ozone layer depletion.

Module 4 Environmental Assessment and Legislation

4 hours

Women education, Role of NGOs regarding environmental protection, Bio indicators and their role, Natural disasters and disasters management, Aims and objectives of Environmental Impact Assessment (EIA). Salient features of following Acts: Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972. Water (Prevention and control of pollution) Act, 1974. Forest (Conserving) Act,



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

1980

Definition and concept of sustainability, impacted areas of sustainable development, Global initiative and issues on sustainable development UNSDsGs, System Thinking and Sustainability.

		Total Lecture Hours 20 hours							
Textb	ook:								
S.No	Book Title with publication agency & year	Author							
1	Brady, N.C. 1990. The nature and properties of Soils, Tenth Edition. Mac Millan Publishing Co., New York	Brady, N.C							
2	Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.	Sodhi G.S							
3	Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.	Dash, M.C							
Refe	rence Books:								
S.No	Book Title with publication agency & year	Author							
1	Rao M.N. and H.V.N. Rao, 1989 : Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi	Rao M.N. and H.V.N. Rao							
2	A Text Book of environmental Science By Shashi Chawla	Shashi Chawla							
NPTE	L/ Youtube/ Faculty Video Link:								
1	https://www.youtube.com/watch?v=T21OO0sBBfc,https://www.youtube.com/watch	n?v=qt8AMjKKPDo							
2	https://www.youtube.com/watch?v=mOwyPENHhbc,https://www.youtube.com/watch?v=_74S3z3IO_I, https://www.youtube.com/watch?v=jXVw6M6m2	ch?v=yqev1G2iy2							
3	https://www.youtube.com/watch?v=7qkaz8ChelI,https://www.youtube.com/watch?v=NuQE5fKmfME https://www.youtube.com/watch?v=9CpAjOVLHII, ttps://www.youtube.com/watch?v=yEci6iDkXYw								
4	https://www.youtube.com/watch?v=ad9KhgGw5iA, https://www.youtube.com/watch?v=xqSZL4Ka8xo	m/watch?v=nW5g83NSH9 M,							

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Offered in: B.Tech. Second Year Sem: FV ME 2 0 0 2	Cours	e Code:	BASCC)401						se Namo		oyability	Skill	L	T	P	С
Course Objectives: The objective of this course is to develop sudents' quantitative and logical reasoning skills through number theory, and togical thinking. Course Outcome; After completion of the course, the student will be able to be obligation thinking. Including direction developes and policial transportation of the course, the student will be able to be obligation; and policy displayed the policy in solve quantitative problems efficiently. See The policy of the policy in solve quantitative problems efficiently. See The policy of the policy of the policy in solve quantitative problems efficiently. See The policy of the poli	Cours	e Offere	d in: B.T	ech. Sec	cond Ye	ar Sem-	IV ME		Deve	юршен				2	0	0	2
theory, analytical puzzles, and business mathematics, enabling them to solve real-world and competitive exam problems with speed, accuracy, and logical thinking. Course Outcome: After completion of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course, the student will be able to deposite the property of the course. The property of the property of the course, the student will be able to deposite the property of t															•		
Description This properties This propertie																	
Course					usiness n	nathema	tics, ena	bling the	em to so	lve real-	world ar	nd compet	titive exa	m proble	ms with	speed	,
CO2 Apply fundamental number theory concepts such as divisibility, HCF & LCM, remainder leaves—and cyclicity to solve quantitative problems efficiently.					tion of th	ne cours	e the sti	ıdent wil	l be abl	e to			Bloom	's Knowl	edge L	evel (K	1.)
COPO Mapping Scale 1											LCM, re	emainder	Bioom	5 Ithowi		5 V C1 (1)	<i>L)</i>
Solve real-life business math problems involving percentages, profit and loss, discounts, and using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business mat	COI	theore	n, and cy	clicity to	solve q	uantitati	ve probl	ems effic	ciently.						K3		
Scise Flood relations, series Patterns, and tume-based puzzles inke clocks and calendars. Science Patterns Pa	CO2																
Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using appropriate mathematical methods Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business math problems involving averages, mixtures, and ratios using Solve real-life business mat																	
CO-PO Solve real-life business math problems involving averages, mixtures, and ratios using Scale Is Low, 2: Wedium, 3: High)	CO3																
CO-PO Mapping Scale 1: Low, 2: Medium, 3: High) FO1	GO 4	Solve real life business meth problems involving averages mixtures and ratios using															
CO - P	CO4							8	,	,		8			K3		
Mapping	CO-P	Э Марр	ing (Scal	e 1: Lov	v, 2: Me	dium, 3	: High)	1	1	T	,	Т	T	1			
Map	СО-Р	O	DO1	DO2	DO2	DO4	DO5	DO(DO7	DOS	DOG	DO10	DO11	DCO1	DCO	, _	
COC	Марр	oing	POI	POZ	POS	PU4	POS	POO	PO/	PU	PO9	POIU	POII	PSOI	PSU.	² J	PSO3
CO3	CO1		1	1	1	1											
COUTED 1	CO2		1	1	1	1											
Course Contents / Syllabus Module 1 Speed Math and Number System S hours Classification of number, Divisibility Rule, Factorization, HCF & LCM, It's Application, Unit digit(Cyclicity), Last two digit, Remainder theorem, Factorial and Number of zeroes, Highest power Module 2 Analytical and Logical Reasoning S hours	CO3		1	1	1	1											
Module 1 Speed Math and Number System 8 hours Classification of number, Divisibility Rule, Factorization, HCF & LCM, It's Application, Unit digit(Cyclicity), Last two digit, Remainder theorem, Factorial and Number of zeroes, Highest power Module 2 Analytical and Logical Reasoning 8 hours Direction and Logical Reasoning 8 hours Module 3 Business Math I 8 hours Percentage, Profit and Loss, Discount, Simple Interest and Compound Interest, Average 8 hours Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Textbook: Textbook: S.No Book Title with publication agency & year Author Referress books: S.No Book Title with publication agency & year Author S.No Author Book Title with publication agency & year Author Profit and Loss, Discount, Simple Interest and Compound Interest, Average Book Total Lecture Hours 32 hours Extraction in the publication agency & year Author Author Author Author	CO4		1	1	1	1											
Module 1 Speed Math and Number System 8 hours Classification of number, Divisibility Rule, Factorization, HCF & LCM, It's Application, Unit digit(Cyclicity), Last two digit, Remainder theorem, Factorial and Number of zeroes, Highest power Module 2 Analytical and Logical Reasoning 8 hours Direction and Logical Reasoning 8 hours Module 3 Business Math I 8 hours Percentage, Profit and Loss, Discount, Simple Interest and Compound Interest, Average 8 hours Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Textbook: Textbook: S.No Book Title with publication agency & year Author Referress books: S.No Book Title with publication agency & year Author S.No Author Book Title with publication agency & year Author Profit and Loss, Discount, Simple Interest and Compound Interest, Average Book Total Lecture Hours 32 hours Extraction in the publication agency & year Author Author Author Author																	
Module 1 Speed Math and Number System 8 hours Classification of number, Divisibility Rule, Factorization, HCF & LCM, It's Application, Unit digit(Cyclicity), Last two digit, Remainder theorem, Factorial and Number of zeroes, Highest power Module 2 Analytical and Logical Reasoning 8 hours Direction and Logical Reasoning 8 hours Module 3 Business Math I 8 hours Percentage, Profit and Loss, Discount, Simple Interest and Compound Interest, Average 8 hours Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Textbook: Textbook: S.No Book Title with publication agency & year Author Referress books: S.No Book Title with publication agency & year Author S.No Author Book Title with publication agency & year Author Profit and Loss, Discount, Simple Interest and Compound Interest, Average Book Total Lecture Hours 32 hours Extraction in the publication agency & year Author Author Author Author	Cours	e Conte	nts / Svlla	ahus													
Classification of number, Divisibility Rule, Factorization, HCF & LCM, It's Application, Unit digit(Cyclicity), Last two digit, Remainder theorem, Factorial and Number of zeroes, Highest power S hours					Number	System	1								81	ours	
Module 2 Analytical and Logical Reasoning 8 hours Direction and Sense, Blood Relation, Number Series and Letter Series, Coding Decoding, Module 3 Business Math I 8 hours Percentage, Profit and Loss, Discount, Simple Interest and Compound Interest, Average Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Textbook: S.No Book Title with publication agency & year Author Reference Books: S.No Book Title with publication agency & year Author 1 Quicker math M. Tyra (BSC publication co. Pvt. Ltd) 2 Quantitative Aptitude RS Aggarwal 3 Verbal & Non-Verbal Reasoning RS Aggarwal	Classif							, HCF &	LCM,	It's App	lication,	Unit digi	t(Cyclici	ty), Last	two dig	it, Rer	nainder
Direction and Sense, Blood Relation, Number Series and Letter Series, Coding Decoding, Module 3	theore	n, Facto	rial and N	Number o	of zeroes	, Highes	st power										
Direction and Sense, Blood Relation, Number Series and Letter Series, Coding Decoding, Module 3	Modul	le 2. A	\ nalvtica	l and La	ogical R	easonin	σ								81	กมาร	
Module 3 Business Math I Shours					_			Letter Se	eries. C	oding De	ecoding.				01	louis	
Percentage, Profit and Loss, Discount, Simple Interest and Compound Interest, Average Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Total Lecture Hours 32 hours Textbook: S.No Book Title with publication agency & year Author Reference Books: S.No Book Title with publication agency & year Author Quicker math M. Tyra (BSC publication co. Pvt. Ltd) Quantitative Aptitude RS Aggarwal Verbal & Non-Verbal Reasoning RS Aggarwal									, -		,						
Module 4 Business Math II 8 hours Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Total Lecture Hours 32 hours Textbook: S.No Book Title with publication agency & year Author S.No Book Title with publication agency & year Author 1 Quicker math Quicker math M. Tyra (BSC publication co. Pvt. Ltd) 2 Quantitative Aptitude RS Aggarwal RS Aggarwal 3 Verbal & Non-Verbal Reasoning RS Aggarwal					~.			. ~							8 ł	ours	
Ratio & Proportion, Partnership, Mixture & Allegation, Clock , Calendar Total Lecture Hours 32 hours Textbook: S.No Book Title with publication agency & year Author Reference Books: S.No Book Title with publication agency & year Author Quicker math M. Tyra (BSC publication co. Pvt. Ltd) Quantitative Aptitude RS Aggarwal Verbal & Non-Verbal Reasoning RS Aggarwal					count, Si	mple In	terest an	d Compo	ound Int	erest, A	verage				0.1		
Total Lecture Hours 32 hours Textbook: S.No Book Title with publication agency & year Author Reference Books: S.No Book Title with publication agency & year Author Quicker math M. Tyra (BSC publication co. Pvt. Ltd) Quantitative Aptitude RS Aggarwal Verbal & Non-Verbal Reasoning RS Aggarwal					Mixture	& Alle	gation (lock C	alendar						01	iours	
Textbook: S.No Book Title with publication agency & year Author S.No Book Title with publication agency & year Author 1 Quicker math M. Tyra (BSC publication co. Pvt. Ltd) 2 Quantitative Aptitude RS Aggarwal 3 Verbal & Non-Verbal Reasoning RS Aggarwal	Ttutio t	<u> </u>	tion, run	incremp,	TVITATUTE	o a rine	Sution, C	JOCK, C	arciidai			To	otal Lect	ure Hou	rs 32	hours	
Reference Books: S.No Book Title with publication agency & year Author Quicker math Quantitative Aptitude RS Aggarwal Verbal & Non-Verbal Reasoning RS Aggarwal	Textbo	ook:															
S.No Book Title with publication agency & year Author 1 Quicker math M. Tyra (BSC publication co. Pvt. Ltd) 2 Quantitative Aptitude RS Aggarwal 3 Verbal & Non-Verbal Reasoning RS Aggarwal	S.No	Book 7	Γitle with	publica	ition ago	ency & y	year					Autho	r				
1Quicker mathM. Tyra (BSC publication co. Pvt. Ltd)2Quantitative AptitudeRS Aggarwal3Verbal & Non-Verbal ReasoningRS Aggarwal	Refer	ence Bo	oks:														
1Quicker mathM. Tyra (BSC publication co. Pvt. Ltd)2Quantitative AptitudeRS Aggarwal3Verbal & Non-Verbal ReasoningRS Aggarwal	S.No	Book 7	Title with	publica	tion age	ency & y	year					Autho	r				
3 Verbal & Non-Verbal Reasoning RS Aggarwal	1	Quicke	r math									M. Ty	ra (BSC	publication	on co. F	vt. Ltd	l)
	2	Quanti	tative Ap	titude								RS Ag	garwal				
4 Quantitative Aptitude - Quantum CAT Sarvesh K Verma	3	Verbal	& Non-V	erbal R	easoning	Ţ						RS Ag	garwal				
Community of the control of the cont	4	Quanti	tative Ap	titude - (Quantun	ı CAT						Sarves	h K Veri	na			



(An Autonomous Institute)
School of Mechanical Engineering

T TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

	School of Mechanical Engineering														
Course Code:	: BAS0405	; <u> </u>					ne: Prob	ability ,	Statisti	cs, and		L	T	P	C
C 000	11 D.	1.0	1 77	- C		ıplex Aı	nalysis					2		•	
Course Offer				ar Sem-	IV ME							3	1	0	4
Pre-requisite: Course Object				COURCE	is to for	ailiariza	the stud	onte witl	h concor	te of stati	stical too	hniquae	nd comp	lov	
variables. It air															cs and
applications th						concept	is and to	015 110111	B. Teer	i to dear w	Till dava	need leve	or math	Ciliati	es ana
Course Outco						ıdent wi	ll be able	e to			Bloom	's Know	ledge Lev	el (K	<u>L)</u>
CO1									ory in	real life					
COI			problem										K3		
Apply the concept of skewness and Kurtosis in the relevant K3															
application area.															
CO3 Apply the concept of Random Variable and Probability K3															
Distributions in real world problems. Apply the working methods of complex functions for finding K3															
CO4			analytic		-	inous o	Compi	cx runci	nons 10	i illiullig			KJ		
						comple	x function	ons for	finding	Taylor's			K3		
CO5			series, L												
CO-PO Mapp	ping (Scale	e 1: Lov	w, 2: Me	dium, 3	: High)										
со-ро															
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	P	SO3
	-	_	+ -	_					—						
CO1	3	2	2	3	1	1	-	1	2	2	2				
CO2	3	2	2	3	1	1	-	1	2	2	2				
CO3	3	2	1	2	-	-	-	-	1	1	1				
CO4	3	2	2	3	_	_	_	_	2	1	1				
CO5	3	2	2	3	1	1		1	2	2	2				
				3	1	1	-	1							
Course Conte	ents / Sylla	bus	G	4. 4. 1	m 1 ·								0.1		
Module 1			Sta	tistical	1 ecnnic	ques-1							8 ho	urs	
Introduction: N	Measures o	of centra	al tenden	cy: Mear	n, Media	ın, Mod	e, Standa	ırd devia	ition, Qu	ıartile dev	iation, M	Ioment, S	kewness	, Kurt	osis.
Module 2			Th	eory of	Probab	ility							8 ho	urs	
Definition of P	Probability	Fleme					ldition ar	nd Multir	nlication	theorems	of prob	ability C	onditiona	1 Prob	ahility
	Toodonity	, Licino							prication	T theorems	or probe	donney, C			domity
Module 3							listribut						8 ho		
Random Varia											andom V	'ariable,	Expected	Valu	e of a
Random Varia Module 4	ibie, Mean	, variar					n, Binom e rentiati		son, No	rmai.			8 ho	II MC	
Limit, Continu	uity and dif	ferentia		_					nctions	Cauchy- I	Riemann	equation			d Polar
							aute, And	ary tre rui	netions,	Caucity - 1	Kicinann	cquation	s (Cartesi	an an	a i Oiai
form), Harmonic function, Method to find Analytic functions. Module 5 Complex Variable Integration Shours													8 ho	urs	
		Module 5Complex Variable – Integration8 hoursComplex integrals, Contour integrals, Cauchy-Goursat theorem (Statement), Cauchy integral formula (Statement), Taylor's series, Laurent's										ent), Tay			urent's
Module 5	grals, Conto	our inte	grals, Cai	ichy-Go	ar bar arr									N / - 41-	
Module 5 Complex integseries, Liouvil	lles's theo	em (St	atement).	Singula		Classific	ation of	Singula	rities, ze	eros of an	alytic fu	nctions, l	Residues,	Metr	ioas oi
Module 5 Complex integ	lles's theo	em (St	atement).	Singula		Classific	ation of	Singula	rities, ze						logs of
Module 5 Complex integseries, Liouvil finding residue	lles's theo	em (St	atement).	Singula		Classific	ation of	Singula	rities, ze			ture Hou		ours	lods of
Module 5 Complex integ series, Liouvil finding residue Textbook:	lles's theo	em (St	atement).	, Singula n.	arities, (rities, ze	To	otal Lect				lods of
Module 5 Complex integ series, Liouvil finding residue Textbook: S.No	lles's theo	em (St	atement) ie theorei Book Ti	Singulan.	publica	ntion ag	ency & y	year	rities, ze	Autho	otal Lect				10ds 01
Module 5 Complex integ series, Liouvil finding residue Textbook: S.No 1	lles's theo	em (St	Book Ti	Singulan. tle with k of Eng	publica	ition ag g Mather	ency & y	year	rities, ze	Autho Bali, N	otal Lect r I.P.				10ds 01
Module 5 Complex integ series, Liouvil finding residue Textbook: S.No 1 2	lles's theo	em (St	Book Ti Textboo	Singulan. tle with k of Enged engine	publication of the publication o	ation ag	ency & y	year	rities, ze	Autho Bali, N Jain, R	r I.P.				lods of
Module 5 Complex integ series, Liouvil finding residue Textbook: S.No 1 2 3	lles's theo	em (St	Book Ti Textboo Advance	tle with k of Enged engineering	publica publica pineering eering m	ation ag	ency & y	year	rities, ze	Autho Bali, N Jain, R Grewa	r I.P. K. I, B.S.				lods of
Module 5 Complex integ series, Liouvil finding residue Textbook: S.No 1 2	lles's theo	em (St	Book Ti Textboo	tle with k of Enged engineering	publications of the publication	ation ag Mathen nathema nematics	ency & y	year	rities, ze	Autho Bali, N Jain, R Grewa Gupta,	r I.P. K. I, B.S.	ture Hou			lods of



(An Autonomous Institute)
School of Mechanical Engineering

	Selicol of Micchain	an Engineering
S.No	Book Title with publication agency & year	Author
1	Introduction to Probability Models	Ross, Sheldon M
2	Probability, Random Variables and Stochastic Processes	Papoulis, Athanasios
3	Advanced engineering mathematics	Kreyszig, E.
NPTEL/ Youtube/	Faculty Video Link:	
1	https://youtu.be/r1sLCDA-kNY?si=CbJiRYQhAT01IghM	
2	https://youtu.be/1MiT06JFNo4?si=zVH-5AdAeu7Qcs9x https://youtu.be/6lQn1hdG43o?si=2WJXQHXJE-ByAghk https://archive.nptel.ac.in/courses/110/107/110107114/	
3	https://archive.nptel.ac.in/courses/111/104/111104032/	
4	https://archive.nptel.ac.in/courses/111/107/111107056/	
5	https://archive.nptel.ac.in/courses/111/103/111103070/	

<u>TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like</u> <u>Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other</u> <u>defined by respective faculty members and may vary to subject-wise and faculty-wise</u>



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

1											iigiiicci					
Cours	e Code: BME	0403			С	ourse Na	me: M	[easure	ment &	Metrolo	gy		L	T	P	С
Cours	e Offered in:	B.Tech. Sec	ond Ye	ar Sem-I	V MF	Č							3	0	0	3
Pre-re	equisite:													•		
limit ga Familia	e Objectives: auging, and in arize with GD ced measuring	spection tecl	hniques.	Learn ad	lvance	d measur	ing tech	nologi	es such a	as CMMs	s, interfer	ometers,	and las	er vision	n.	ign,
	e Outcome: A		tion of t	he course	, the st	tudent wi	ll be ab	le to						n's Kno	wle	dge
CO1	Ability to ap standards.	ply dimensi	onal me	trology p	rincipl	les for qu	ality co	ntrol ar	nd comp	oliance w	ith			К3		
CO2	Competence assembly.													K4		
CO3	Proficiency measuremen	its.								for accur	ate			К3		
CO4	Capability to					•					accurately	у.		K4		
CO5	Understandi manufacturi	ng processes					on in pi	recision	measu	rements	for			K3		
CO-PO	O Mapping (S	Scale 1: Low	7, 2: Me	dium, 3:	High)		т —	1		1		1		1		
	CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO	1 PSC)2	PSO
	CO1	3	2	1	1	3	1	1	1	1	1	2	3	2		
ļ	CO2	2	2	2	1	2	1	1	2	1	1	2	3	2		
	CO3	3	2	1	2	3	1	1	1	1	1	3	3	3		
	CO4	2	3	2	2	3	1	1	1	1	1	2	3	3		
	CO5	2	2	2	2	3	1	1	1	1	2	3	3	3		
	e Contents / S	Syllabus				. 35.								0.1		
Applic	uction to Direction of tole tion by measu	erances, Lin	nit gau	gy, Stand ging- Ta	dardiza ylor's		terchan			ective as	sembly,	Indian st	andard	8 ho		
Modul	le 2			Inspecti	ion									8 ho	urs	
	T, Applications			•	nspect	ion of Su	rface Q	uality,	Feature	inspectio	n- Straigh	ntness, Fl	atness,	Parallel	ism	,
Square Modu l	eness, Circular le 3	ity, and Rou	ndness.	Measur	ing M	achines								8 ho	urs	
Workiı	s, Applications	of Touch T	rigger l	s, Materia Probe, A	ıls used lignme	d for diffe ent, Type	es of e	rrors, I	_	g, Hard Pr	obing and	d Soft pro	bing, (
Modul	rement, Temp	erature Mea	suremer				e and I	orque.						8 ho	lirc.	
	ced measuring	o machines	CNC	Advanc			n_nroce	ce cont	ring 3r) metrolo	ov Metr	ology so	ftware			
instrun technic	mentation, Sta ques, Complex logies and Rac	ge position x opto-mech	metrolo anical a	ogy, Testi assemblies	ng and	d certific	ation se	ervices,	Optica							



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Module	5	Computer Aided Inspection						
measurer Electro	ments - Laser interferon optical sensors for d	inciples and interfacing, Software metrolog neter, Speckle measurements, Laser scanners imensional metrology- non-contact senso and its application in metrology.	s. Coordinate Measuring Machine – Non- rs for surface finish	contact CMN				
Textboo	1		Total Lecture Hou	rs 40 hours				
S.No	-	lication agency & year	Author					
1	Experimental Metho		Holman, MCGRAW HILL	INDIA				
2	Mechanical Measure		Beckwith, Pearson					
3	Principles of Measur	ement Systems	Bentley, Pearson					
4	Metrology of Measur							
5	Measurement System	ns, Application Design	Doeblein, MCGRAW HILI	LINDIA				
6	Hume K.J., "Enginee	ering Metrology"	MacDonald and Co					
Refe	rence Books:							
S.No	Book Title with pub	lication agency & year	Author					
1	Engineering Metrolo	gy," Khanna Publishers	Jain, R.K					
2	Mechanical Measure	ment," Khanna Publishers	Jain, R.K					
3	Engineering Metrolo	gy, Dhanpat Rai Publications	Gupta S.C					
NPTEL/	Youtube/ Faculty Video	Link:	<u> </u>					
Module	1 Mechanical Engi	neering - NOC: Engineering Metrology						
Module 2 Computer Aide		1 Design and Manufacturing (Mechanical Engineering)						
Module :	3 Metrology, IIT M	Iadras						

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

<u> </u>							•	3011001	OI IVICE	Harrica	Liigiile	cring				
Course	Code:	BME0402			Cou	rse Nan	ne: Com	puter In	tegrated	Manufa	cturing		L	T	P	С
Course	Course Offered in: B.Tech. Second Year Sem-IV ME										0	0	3			
Pre-req	uisite:	Manufactu	ring scie	ence and	Techno	logy									I I	
Course	Object	tives: This	course	introduc	es Com	puter In	tegrated	Manufa	cturing (CIM) ar	nd Smart	Manufact	uring,	cov	ering ess	sential
processe	es, data	flow, and	l subsys	tem integ	gration.	Students	will lea	ırn abou	t comput	ter graph	nics, inclu	ding CAI	D syst	ems	and geo	metric
		. The cour				_	-								-	
		ng, flexible								as AI, N	Iachine L	earning,	Deep	Lear	ning, and	d IoT,
focusing	g on the	ir roles in	enhancii	ng manuf	acturing	process	es and ef	ficiency.								
•											Bloo Leve		Knowled	ge		
CO1	Unde	rstand the	concept	of comp	uter inte	grated m	anufactu	ring.						- (K2	
CO2	Unde	rstand Dif ration and	fferent t	ypes of	geomet	ric trans			during	CAD ge	eometry				K3	
CO3		emonstrate					ne nart ni	noram							K3	
		rstand the							technolo	nov and f	lexible					
CO4		facturing.	сопсерт	or comp	ater arac	a proces	s planin	15, 510 u p	teemor	ogy una i	icaioic				K3	
CO5		ply the co	ncept of	modern	compute	er-based	technolog	gies.							K3	
CO-PO	Mappi	ng (Scale	1: Low,	2: Medi	um, 3: I	High)		_								
CO-PO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO	1	PSO2	PSO3
CO1		3	2	2	-	2	-	-	-	-	-	2	2	,	2	
CO2		3	2	2	-	3	-	-	-	-	-	2	3		2	
CO3		3	2	3	2	3	-	-	1	1	1	2	3	1	3	
CO4		3	2	3	2	3	2	-	-	-	-	2	3	1	3	
CO5		3	2	2	2	3	2	1	-	-	1	3	3		3	
		ts / Syllab														
Module				Introdu											8 hours	
		CIM, Data			IM whee	el, Proce	sses invo	olved, CI	M integr	ation, su	b system	of CIM,				
		Smart mar	-												_	
Module				Comput											8 hours	
		design, C						stems in	CAD, T	ransforn	nation of	geometry	, Colo	ur		
		rical proble													0 1	
Module				CNC M											8 hours	
CNC To	ooling:	CNC tooli	ng mech	anism, A	ATC. Ad	aptive co	ontrol.		y Cyrota	no I imi	totions of	Crown T	aab	loo:		
		ology: Ber					ı ramıly	, Couing	z systen	is, Limi	tations of	Group I	ecimo			
Module		•		Advance					•	<u> </u>	1 3.5		C		8 hours	
Advance	ed mea	suring ma	chines,	UNC sys	tems, L	aser visi	ion, In-p	rocess g	auging,	3D metr	otogy, M	etrology s	softwa	re, N	Nanotech	nology

instrumentation, Stage position metrology, Testing and certification services, Optical system, Lens, Coating, Precision lens assembly

techniques, Complex opto-mechanical assemblies, Contact bonding and other joining

technologies and Radioactive technologies.



(An Autonomous Institute)
School of Mechanical Engineering

Module	5	Computer Aided Inspection							
measure Electro	ements - Laser interferon optical sensors for d	inciples and interfacing, Software metrology. La neter, Speckle measurements, Laser scanners. Coc imensional metrology- non-contact sensors for g and its application in metrology.	ordinate Measuring Machine – Non-conta						
			Total Lecture Hours 4	40 hours					
Textboo		. l' - 4' 0	A 41						
S.No		blication agency & year	Author	D					
1	Handbook of Flexib	le Manufacturing System	Editor: Nand K. Jha (Academic San Diego, California	Press,					
2	Automation, Production	tion System & Computer Integrated	Groover (PHI)						
3	Flexible Manufactur	ing System	Wernecks (Spring- Verlag).						
4	CAD/CAM		- P. N. Rao (Tata McGraw Hill)						
5	Automation, Production Manufacturing System	Mikell P. Groover							
Ref	erence Books:								
S.No	Book Title with pub	olication agency & year	Author						
1	Handbook of Flexib	le Manufacturing System	Editor: Nand K. Jha (Academic Press, San Diego, California).						
2	Automation, Produc Manufacturing-	tion System & Computer Integrated	Groover (PHI).						
3	Performance Modell	ing of Automated Manufacturing Systems	Vishwanathan & Narahari (PHI))					
NPTEL/	/ Youtube/ Faculty Video	D Link:							
Module	1 https://archive.np	tel.ac.in/courses/112/104/112104289/							
Module	2 https://archive.np	tel.ac.in/courses/112/105/112105211/							
Module	3 https://nptel.ac.in	in/courses/112102103							
Module	ule 4 https://archive.nptel.ac.in/courses/110/106/110106044/								

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BME0404	Course Name: Fluid Mechanics & Machines	L	T	P	С
Course Offered in: B.Tech. Second Year Sem-F	V ME	3	0	0	3

Pre-requisite: Engineering Mathematics, Engineering Mechanics

Course Objectives: 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 (Dutcome: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1	Understand fluid properties, laws, and applications in measurements, buoyancy, Bernoulli's equation, and hydrostatic force analysis.	K2
CO2	Analyze continuum and free molecular flows, including various flow types, equations, dimensionless numbers, and aerodynamic concepts.	K4
СОЗ	Apply the fluid flow through pipes, turbulence characteristics, boundary layer dynamics, and application of momentum equations.	К3
CO4	Understand and apply momentum equations, hydrodynamic thrust, turbine classifications, velocity triangles, power/efficiency calculations, and turbine selection principles.	К3
CO5	Understand classifications, efficiencies, performance, and characteristics of centrifugal and reciprocating pumps, compressors, and related systems.	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	1	_	_	_	-	1	3	2	
CO2	3	3	2	2	3	1	_	_	_	-	2	3	3	
CO3	3	3	2	3	3	1	_	_	_	-	2	3	3	
CO4	3	3	3	3	3	1	_	_	_	_	2	3	3	
CO5	3	2	2	2	3	1	_	_	_	-	2	3	3	

Course Contents / Syllabus

Module 1 Fluid Properties 8 hours

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.

Module 2 Fluid Flow Analysis 8 hours

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.

Module 3 Pipe Flow and Boundary Layer Analysis 8 hours

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 layer, application of momentum equation, turbulent boundary layer, laminar sub layer, separation and its control.



Module 2

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

	School of Mecha	mear Engineering	
Module 4	Prime Movers and Thrust Analysis		8 hours
series of calculation	n equation and its applications, Introduction to hydrodynamic thrust of jet vanes, Classification of turbines, Impulse turbines, Constructional detas, Governing of Pelton wheel. Francis and Kaplan turbines, Constructional of similarity, Unit and specific speed, Performance characteristics, Selectionines.	ails, Velocity triangles, Power a details, Velocity triangles, Power a	nd efficiency
Module 5	Fluid Pumps and Devices		8 hours
Cavitation vessels, C	ions of centrifugal pumps, Vector diagram, Work done by impellor, Eff. & separation, Performance characteristics. Reciprocating pump theory, Slipmparison of centrifugal and reciprocating pumps, Performance characteristic convertor, Air jet pump, Vacuum pumps, Pressure regulators, Introduction	p, Indicator diagram, Effect of accestics, Hydraulic	-
Textbook			
S.No	Book Title with publication agency & year	Author	
1	F. M. White, Fluid Mechanics, 6th Ed., Tata McGraw-Hill, 2008.	F. M. White	
2	Fluid Mechanics and Its Applications by V.K. Gupta et.al	V.K. Gupta	
3	Batchelor, G. K. (1999). Introduction to fluid dynamics. New Delhi, India: Cambridge University Press	Batchelor, G. K.	
4	Acheson, D. J. (1990). Elementary fluid dynamics. New York, USA: Oxford University Press.	Acheson, D. J.	
5	R.W. Fox, A.T. McDonald and P.J. Pritchard, Introduction to Fluid Mechanics, 6th Ed., John Wiley, 2004.	R.W. Fox, A.T. McDonald Pritchard	and P.J.
Refer	ence Books:		
S.No	Book Title with publication agency & year	Author	
1	Fluid mechanics and machines by R.K Bansal.	R.K Bansal	
2	Fluid mechanics by R. K. Rajput, S. Chand and Company Limited.	R. K. Rajput	
3	Fluid Mechanics by Yunus Cengel.	Yunus Cengel.	
4	Introduction to fluid mechanics and Fluid machines by S.K. Som, Gautam Biswas, S Chakraborty	S.K. Som, Gautam Biswas, S Chakraborty	
NPTEL/ Y	Toutube/ Faculty Video Link:		
Module 1	NPTEL: Mechanical Engineering - NOC: Introduction to Fluid Mechanical	nics	

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise

NPTEL: Mechanical Engineering - NOC: Fluid Machines



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Course Code: BME0453	LAB Course Name: Measurement and Metrology Lab	L	T	P	C
Course Offered in: B.Tech. Second Year S	em-IV ME	0	0	2	1

Pre-requisite: Understanding of fundamental Basic knowledge of physics, engineering mechanics, mathematics, drawing, manufacturing processes, basic metrology theory, instrumentation basics and computer skills.

Course Objectives:

- 1. To provide students with the necessary skills for calibration and testing of different gauges and instruments.
- 2. To provide students with the necessary skills to collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures using various metrology instruments.
- 3. To expose students to modern measurement techniques and metrology tools such as optical projectors, autocollimators, and strain gauges, enabling them to evaluate mechanical properties and geometrical features of machine components.

Course	Outcome: After completion of the course, the student will be able to	Bloom's Knowledge
		Level (KL)
CO1	To provide students with the necessary skills for calibration and testing of different gauges and instruments.	K2
CO2	To provide students with the necessary skills to collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures using various metrology instruments.	K3
CO3	To demonstrate proficiency in using modern metrology tools to evaluate dimensional accuracy, surface finish, and mechanical properties of engineering components.	К3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PS03
CO1	3	2	2	2	3	1	1	1	2	1	2	3	1	2
CO2	3	3	2	3	3	1	1	2	2	2	3	3	2	2
CO3	2	2	1	3	3	-	1	-	-	-	-	2	3	-

List Of Practical's (Indicative & Not Limited To)

- 1. To study about measurements and metrology
- 2. Performance on linear measurements using Vernier Caliper, Vernier height gauge, and Micrometer.
- 3. To study about Temperature Measurement.
- 4. To study about Stress, Strain and Force Measurements.
- 5. Determination of modulus of elasticity of a mild steel specimen using strain gauges.
- 6. Measurements using Optical Projector / Toolmaker Microscope.
- 7. Performance on linear measurements using Vernier Calliper, Vernier height gauge, and Micrometer.
- 8. Measurement of alignment using Autocollimator / Roller set.
- 9. To Study about Torque and Speed and accelaration Measurement.
- 10. Performance on Gear and Screw Thread Measurement (two wire method, screw pitch gauge)
- 11. To Study about Surface Measurements.
- 12. Measurement of gear tooth profile using gear tooth Vernier /Gear tooth micrometer
- 13. Calibration of Micrometer using slip gauges.
- 14. Measurement using Optical Flats.

Total Hours: 30 hrs.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Course Code: BME0454	LAB Course Name: Fluid Mechanics & Machines Lab	L	Т	P	С
Course Offered in: B.Tech. Second Year	: Sem-IV ME	0	0	2	1

Pre-requisite: Basic Knowledge of Physics and Mathematics.

Course Objectives:

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 (Dutcome: After completion of the course, the student will be able to	Bloom's Knowledge
		Level (KL)
CO1	Demonstrate performance characteristics of flow and flow measuring devices.	K2
CO2	Demonstrate various turbines and determine their efficiency.	K2
CO3	Demonstrate various pumps and determine their efficiency.	K2
CO4	Demonstrate various compressor and determine their efficiency.	K2
CO5	Demonstrate hydraulic ram and determine its efficiency.	K2

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	1	_	_	_	_	1	3	3	
CO2	3	2	2	3	3	1	_	_	_	_	1	3	3	
CO3	3	2	2	3	3	1	_	_	_	_	1	3	3	
CO4	3	2	2	3	3	1	_	_	_	_	1	3	3	
CO5	3	2	2	3	3	1	_	_	_	_	1	3	3	

List Of Practical's (Indicative & Not Limited To)

- 1. To verify the Bernoulli's Theorem.
- 2. To determine the coefficient of discharge of venturi meter.
- 3. To determine coefficient of discharge of an orifice meter
- 4. To determine the coefficient of discharge of Notch (V and Rectangular types)
- 5. To determine the minor losses due to sudden enlargement, sudden contraction, and bends.
- 6. To determine the coefficient of discharge, contraction & velocity of an orifice.
- 7. To find critical Reynolds number for a pipe flow.
- 8. To determine the coefficient of impact for vanes.
- 9. Experiments on performance of Pelton wheel
- 10. To study of various Reaction turbines.
- 11. Experiments on performance of Francis turbine
- 12. Experiments on performance of Centrifugal Pump
- 13. Experiments on performance of reciprocating pump
- 14. To study of Gear pump.
- 15. To demonstrate centrifugal compressor and find the efficiency.
- 16. To demonstrate hydraulic ram and find the efficiency.

Total Hours: 30 hrs.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

LAB Course Code: BME0455	LAB Course Name: Machine Design and Application of FEA	L	T	P	С
Course Offered in: B.Tech. Second Year S	Sem-IV ME	0	0	6	3

Pre-requisite: Mechanics, Strength of Materials

Course Objectives:

This course aims to introduce students to the fundamentals of Finite Element Analysis (FEA) and its practical applications in mechanical design. It equips students with the knowledge and skills to design and analyze machine components such as shafts, gears, bearings, and joints under static, dynamic, and fluctuating loads using both analytical methods and FEM software tools. The course also emphasizes understanding material behavior, fatigue, failure theories, and design optimization to ensure the strength, reliability, and efficiency of mechanical systems.

Course	Outcome: After completion of the course, the student will be able to	Bloom's Knowledge
		Level (KL)
CO1	Understand the fundamentals and workflow of Finite Element Analysis (FEA).	K2
CO2	Analyze mechanical components under static and dynamic loading conditions.	K4
CO3	Apply failure theories and fatigue concepts in mechanical design.	K4
CO4	Design and evaluate gear and bearings using analytical and FEM methods.	K4
CO5	Design and evaluate joints using analytical and FEM methods.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	1	1	1	1	1	1	3	2	
CO2	3	3	3	2	2	1	1	1	1	1	1	3	3	
CO3	3	3	3	2	2	1	1	1	1	2	1	3	2	
CO4	3	3	3	3	3	1	1	1	1	2	2	3	3	
CO5	3	3	3	3	3	1	1	1	1	2	2	3	3	

List Of Practical's (Indicative & Not Limited To)

- 1. Introduction to FEA Packages.
- 2. Direct stress in uniform and non-uniform cross section rod.
- 3. Shaft under combined loading
- 4. Analysis of plate, shaft using FEA package under fluctuating load, Visualization of stress, criterion of failure.
- 5. Cyclic stresses, Fatigue and endurance limit, Stress concentration, Notch sensitivity, Design for finite and infinite life, Soderberg, Goodman & Gerber criteria.
- 6. Design and analysis of plate having notch or circular hole FEA package under fluctuating load, Visualization of stress, criterion of failure.
- 7. Stress visualization in Spur Gears using FEA Package
- 8. Stress visualization in Helical Gears using FEA Package
- 9. Stress visualization in spur gears and gear shaft using FEA Package
- 10. Stress visualization in worm gears using FEA Package
- 11. Thermal modeling of worm gear
- 12. Stress visualization in worm gear system using FEA Package.
- 13. Drafting of Bearing on Solid modeling software.
- 14. Analysis of stress concentration in Ball Bearing using FEA Package.
- 15. Analysis of stress concentration in Roller Bearing using FEA Package.



(An Autonomous Institute)
School of Mechanical Engineering

- 16. Analysis of Stress concentration in Needle Bearing using FEA Package.
- 17. Stress analysis in different types of Gear using FEA Package.
- 18. Stress analysis in Threaded bolt and rivet joints using FEA Package.
- 19. Stress analysis in different types of Welded Joints using FEA Package.
- 20. Stress analysis in spring under different loading conditions using FEA Package.

Total Hours: 30 hrs.



GREATER NOIDA-201306 (An Autonomous Institute)

School of Mechanical Engineering

Course	Pre-requisite: Basic understanding of AL Cybercrime, Computer System and Ethics																
	Course Offered in: B.Tech. Second Year Sem-IV ME Cre-requisite: Basic understanding of AI, Cybercrime, Computer System and Ethics																
	Course Offered in: B.Tech. Second Year Sem-IV ME re-requisite: Basic understanding of AI, Cybercrime, Computer System and Ethics Course Objectives: The course aims to foster critical thinking about ethical issues, promote responsible use of technology, not ensure students can identify, analyze, and address ethical dilemmas in Artificial Intelligence and cyber domains. Course Outcome: After completion of the course, the student will be able to Learn key principles of AI ethics, summarizing ethical considerations and applications in AI development and deployment. COI Apply policies and framework for Fairness in AI and Machine Learning. Apply privacy and security concepts, risk management and regulatory compliance in the field of AI and Cyber Security. CO-PO Mapping (Scale I: Low, 2: Medium, 3: High) CO-PO Mapping (Scale I: Low, 2: Medium, 3: High) CO-PO Mapping POI PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PS01 PS02 PS03 CO4 2 3 2 1 2 2 1 1 2 2 1 1 1 1 1 1 1 1 1 1																
												ote respon	sible us	e of t	echn	ology	
																	,
				-	_						10141 1111	emgenee u	III cy st				ladaa
Course	•																leage
CO1						, sumr	narizing	ethical	consid	derations	and ap	plications	in AI		ŀ	ζ2	
CO2	Apply	policies	and fra	amewo	rk for F	airness	in AI an	d Macl	nine Lea	arning.					ŀ	ζ3	
CO3	Apply	privacy	and se								npliance i	in the field	of AI		ŀ	ζ3	
CO4	Under	stand th	e natur							ual prope	erty right	s (IPR), ar	nd the		ŀ	ζ2	
CO-PC								SC 155U	cs.								
Course Offered in: B. Tech. Second Year Sem:TV MIE																	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PS	02	PSO	3
CO1			1				1	2				2	1	1	1	1	
CO2		2 3 2 2 1 2 2 1 2 2 1 1															
CO3																	
CO4																	
Course	Conten	ts / Sylla	bus														
											lemma,	Human-Ce	ntric De	sign,	Intro	oducti	on to
		Ethics,	Histori														
											1110 101 1	411110 55 111	,		- 4144	00110	, ,
																8 hou	rs
		rivacy aı	nd Secu					_			Privacy-F	reserving l	Machine	Lear			
and Pri	vacy-Pre	serving l	Data M	ining (I	PPDM)	, Risk N	Managem	nent: Ri	sk Asse	essment a	and Incid	ent Respor	ise, Reg	ulator			
		cuse st	udies. I							sest prae.	irees in e.	<u>ngmeering</u>	projects	•		8 hou	rs
		crimes a	nd their							revention	and Pro	secution, I	PR: Cor	vrigh			
Global	Cyber La	aws, Cas	e Study	: The A	ATM H	eist – C	Cosmos B	ank Cy	ber Att	tack (Ind	ia, 2018)	•					
Toytha	alr.											Total	Lecture	Hou	rs	30 ho	urs
		ficial Int	elligen	ce: A G	uide fo	r Think	ing Hum	nans		b	y Melani	e Mitchell,	Penguii	ı Boo	ks, 2	019.	
2	Cyb	er Ethics	: Mora	lity and	I Law ii	ı Cyhei	rsnace			b	v Richard	1 Spinello	Iones &	Rart	ett I	earnir	10
			. wiora	iity airc	Law II	- Cybel	гэрисс						Jones &	Dart	Ctt L	cariii	15,
Refere	September Code Co																
1	Arti	ficial Int	elligen	ce and l	Ethics								ajit Bisv	as, B	PB		
2	Cyb	er Secur	ity and	Cyber 1	Laws					b	y Alfred	Basta, Nad		a, Sat	twik	Panda	a,
NPTE	L/ You	Tube/ I	Facult	y Vide	eo Lin	k:				C	engage I	ndia, 2022.					
1.							n?v=Vq	FaW/I	aOP1	σ							
1.		<u>111/05.//V</u>	<u>v w w . y</u>	<u>outub</u>	c.com	<i>i</i> watel	1:v-v <u>q</u>	<u>1 '4 W I</u>	<u>qob1</u>	<u>e</u>							



(An Autonomous Institute)

	School of Mechanical Engineering
2.	https://www.youtube.com/watch?v=hVJqHgqF59A
3.	https://www.youtube.com/watch?v=O5RX_T4Tg24
4.	https://www.youtube.com/watch?v=RJZ0pxcZsSQ

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

List of Program Electives

Course Code:	BME0412			(Course N	lame: Fa	actory A	utomati	on			L	T	P	С
Course Offere	ed in: B.Tech.	Secon	d Year Se	m-IV	ME							3	0	0	3
Pre-requisite:															
Course Objec															
environments,											ll gain a co	mprehe	nsive u	nder	standing
of automation	_					•			o apply	this					
knowledge to i															
Course Outco		•										Bloor Level	n's Kno (KL)	wle	lge
CO1	explain the p elements, advanced fur	_		_			n produc	ction syst	ems, ii	ncluding t	oasic	K2			
CO2	design and a												K4		
CO3	analyze and						stems.						K		
CO4	apply industr	rial co	ntrol syster	ns.									K	3	
CO5	design and in			K	4										
CO-PO Mapp	ing (Scale 1:	Low, 2	2: Medium	ı, 3: F	ligh)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO	1 PS	O2	PSO3
CO1	3	3	3	3	3	2	-	-	-	ı	2	3	2	2	
CO2	3	3	3	3	3	2	-	-	-	1	2	3	2	2	
CO3	3	3	3	3	3	2	-	-	-	ı	2	3	2	2	
CO4	3	3	3	3	3	2	-	-	-	ı	2	3	2	2	
CO5	3	3	3	3	3	2	-	-	-	-	2	3	2	2	
Course Conte	nts / Syllabus														
Module 1			troductio										8 hc		
Introduction to															1,
Advanced Aut	omation Funct									ms, Fund	amentals o	of Trans			
Module 2			laterial Ha									~	8 h		
Overview of A Overview of A					ons of M	laterial F	landling	Systems	s, Mate	rial Trans	sport Syste	ms, Sto	rage Sys	stem	s,
Module 3		A	utomated	Man	ufacturi	ng Syste	ems						8 hc	ours	
Components, 0															FMS
and its Plannin Inspection Prin							ditional	and Mod	lern Qı	ality Con	ntrol Metho	ods, SPC	C Tools,		
Module 4		C	ontrol Tec	chnol	ogies in	Automa	tion:						8 h	ours	
Industrial Con	trol Systems,	Proce	ss Industr	ies ve	ersus Di	screte M	I anufact	uring In	dustrie	s, Contin	uous Vers	us Disc	rete Co	ontro	1,
Computer Prod	ess and its For	rms.													
Module 5	<u></u>	C	omputer I	Based	Industr	rial Cont	trol:				· <u> </u>		8 h	ours	
Introduction &	Automatic Pr	ocess	Control, B	uildin	g Block	s of Auto	omation	Systems:	LAN,	Analog &	& Digital I	O Mod	ules, SC	AD.	Ā
Systems & RT	U. Distributed	Contr	ol System:	Func	tional R	equireme	ents, Con	figuratio	ns.						
										To	otal Lectu	re Hour	s 40 ł	our	s
Textbook:	T														
S.No	Book Title v	vith pu	ıblication	agen	cy & yea	ar			A	uthor					



(An Autonomous Institute)
School of Mechanical Engineering

4		MIL II D. C.
1	Automation, Production Systems, and Computer-Integrated Manufacturing	Mikell P. Groover
2	Manufacturing Automation: Metal Cutting Mechanics, Machine Tool	Yusuf Altintas
	Vibrations, and CNC Design	
3	Industrial Automation: Handbook of the Practical Man	Frank Lamb
4	Automated Manufacturing Systems with PLCs	Hugh Jack
Refe	rence Books:	
GN		
S.No	Book Title with publication agency & year	Author
1	Computer Control of Machines and Processes	John G. Bollinger and Neil A. Duffie
2	Industrial Control Electronics: Applications and Design	J. Michael Jacob
3	Automation and Control Systems	Frank Petruzella
NPTEL	Youtube/ Faculty Video Link:	
	. 11 //	
Module	1 https://www.youtube.com/@realpars	
Module	2 https://www.youtube.com/@Automationanywhere	

<u>TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like</u> <u>Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other</u> <u>defined by respective faculty members and may vary to subject-wise and faculty-wise</u>



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Course Code: BME0411	Course Name: Automotive Engineering	L	T	P	С
Course Offered in: B.Tech. Second Year S	em-IV ME	3	0	0	3

Pre-requisite: Basic knowledge of physics, mathematics, and mechanical engineering is essential for automotive engineering. Understanding concepts in thermodynamics, fluid mechanics, and electrical circuits helps in grasping engine and vehicle systems. Familiarity with engineering drawing and CAD tools also supports learning of design and structural aspects of automobiles effectively.

Course Objectives: This course aims to introduce fundamental concepts of automobile engineering, including vehicle layout, power dynamics, and resistances. It will explore the principles and performance of internal combustion engines, as well as the emerging field of electric and hybrid vehicles. Students will gain an understanding of essential vehicle systems like transmission, breaking, and electrical components. Finally, the course will expose students to modern automotive technologies, including ADAS, connectivity, and future trends in the industry.

Course	Course Outcome: After completion of the course, the student will be able to					
		Level (KL)				
CO1	Describe the fundamental principles of automobile engineering, including the general layout of a vehicle and the concepts of power, torque, and various resistances to motion.	K2				
CO2	Explain the working principles, components, and performance characteristics of both Spark Ignition and Compression Ignition internal combustion engines, including their cycles, timing diagrams, emissions, and firing order.	K2				
CO3	Explain EV, hybrid types, propulsion types, energy, and comparing their environmental and economic impacts against conventional vehicles.	K2				
CO4	Explain the operation of different automotive transmission systems and braking systems	K2				
CO5	Discuss ADAS, telematics, infotainment, sensors, ECUs, CAN bus, autonomous/connected concepts, advanced materials, IoT, and cybersecurity trends.	K2				

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	2	2	2	2	1	1	2	2	
CO2	3	2	2	2	2	2	3	2	2	1	1	2	3	
CO3	3	2	2	1	2	2	2	2	1	1	1	2	2	
CO4	3	2	3	2	2	1	2	2	2	1	1	2	2	
CO5	3	2	1	1	2	2	2	2	1	1	1	2	3	

Course Contents / Syllabus

Module 1 Introduction to Automotive Engineering 8 hours

Introduction to Automobile Engineering: Definition, history, and importance of automobiles in modern transportation. **Classification of Automobiles:** Based on purpose, fuel type, drive type, and body style (e.g., passenger cars, commercial vehicles, electric vehicles). **Vehicle Configurations:** Front-engine, rear-engine, mid-engine layouts; drive types – FWD, RWD, AWD/4WD.

Introduction to Vehicle Dimensions and Terminology: Wheelbase, track width, ground clearance, approach/departure angles, etc. **General Layout of an Automobile:** Overview of main systems powertrain, chassis, suspension, braking, steering, electrical, and body components.

Module 2 I.C. Engines Vehicles 8 hours

Introduction to I.C. Engines: Basic principles and working of internal combustion engines; classification – spark ignition (SI) and compression ignition (CI) engines.

Engine Types and Configurations: 2-stroke vs 4-stroke engines, inline vs V-type engines, air-cooled vs water-cooled engines.

Main Components of I.C. Engines: Engine block, piston, crankshaft, connecting rod, camshaft, valves, cylinder head, flywheel.



GREATER NOIDA-201306

(An Autonomous Institute)
School of Mechanical Engineering

Engine Systems Overview: Fuel supply system (carburetor, fuel injection, common rail direct injection). Ignition system (battery ignition, magneto, spark plugs). Cooling system (radiator, thermostat, coolant, water pump). Lubrication system (wet sump, dry sump, oil pump, oil filters).

Basic Engine Terminology: Bore, stroke, compression ratio, displacement, power, torque, efficiency.

Module 3 Electric and Hybrid Vehicles 8 hours

Introduction to Electric Vehicles (EVs): Evolution, need for electrification, advantages and challenges of electric mobility.

Classification of Electric Vehicles: Battery Electric Vehicles (BEVs), Hybrid Electric Vehicles (HEVs), Plug-in Hybrid Electric Vehicles (PHEVs), and Fuel Cell Vehicles (FCVs).

Basic Components of an Electric Vehicle: Electric motor, battery pack, power electronics, inverter, converter, and electric drivetrain. **Types of Electric Motors Used**: DC motors, Brushless DC (BLDC), Induction motors, Permanent Magnet Synchronous Motors (PMSM).

Battery Technologies: Lead-acid, Nickel-Metal Hydride (NiMH), Lithium-ion batteries – structure, working, advantages, limitations. Hybrid Powertrain Architectures: Series, parallel, and series-parallel hybrids working principles and power flow.

Regenerative Braking and Energy Recovery: Concept and operation in EVs and hybrids.

Comparison with I.C. Engine Vehicles: Efficiency, emissions, range, maintenance, and overall performance.

Module 4 Transmission and Braking System 8 hours

Clutch Systems – Types of clutches: single plate, multi-plate, centrifugal, and diaphragm; basic operation and applications.

Gearboxes – Manual (sliding mesh, constant mesh, synchromesh) and automatic transmissions (CVT, AMT, DCT); gear shifting mechanisms. Final Drive and Differential – Function and construction; power transmission to wheels in various drivetrain layouts.

Drive Configurations – Overview of FWD, RWD, AWD, and 4WD systems with their advantages and use cases.

Module 5 Modern Automotive Technologies 8 hours

Automotive Electronics: Role of Electronic Control Units (ECUs), Integrated Circuit Modules (ICMs), sensors, and actuators in controlling vehicle performance, safety, and emissions.

On-Board Diagnostics (OBD): OBD-II and OBD-III systems, real-time monitoring, diagnostic trouble codes (DTCs), and advanced fault detection systems.

Advanced Driver Assistance Systems (ADAS) – Features like Lane Departure Warning (LDW), Forward Collision Warning (FCW), Automatic Emergency Braking (AEB), Pedestrian Detection, Adaptive Cruise Control (ACC), Traffic Sign Recognition (TSR), and 360-degree cameras.

		Total Lecture Hours 40 hours						
Textbook:								
S.No	Book Title with publication agency & year	Author						
1	Automobile Engineering	Newton and Steeds						
2	Automobile Engineering	Ramakrishna, PHI, India.						
3	Automobile Engineering	Kripal Singh						
Refer	rence Books:							
S.No	Book Title with publication agency & year	Author						
1	Automotive Engineering-	Hietner.						
2	Automobile Engineering -	Narang						
3	Automobile Engineering –	TTTI, Pearson India						

NPTEL/ Youtube/ Faculty Video Link:

Module 1	1:- http://digimat.in/nptel/courses/video/107106088/L01.html
Module 2	2:https://www.google.com/search?q=https://www.youtube.com/playlist%3Flist%3DPLwdnKv6Jags1bzjeJRhFTfVn1L7JmZJma



(An Autonomous Institute)
School of Mechanical Engineering

Module 3

3:- https://onlinecourses.nptel.ac.in/noc24 de03/preview

<u>TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like</u> <u>Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other</u> <u>defined by respective faculty members and may vary to subject-wise and faculty-wise</u>



Pre-requisite: Basic Knowledge of Maths

Course Offered in: B.Tech. Second Year Sem-IV ME

Course Code: BME0413

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

L

3

T

0

P

C

3

(An Autonomous Institute)
School of Mechanical Engineering

Course Outcome: After completion of the course, the student will be able to												ectors.	Bloom's Level (K	s Knowledg (L)	ţe	
CO1	Understand the fundamental concepts and strategic importance of Operations Management.												K2			
CO2	Design products, processes, and facility layouts effectively for various production systems.													К3		
CO3	Apply forecasting and aggregate planning techniques for efficient resource management and demand fulfillment.												K3			
CO4	Manage inventory effectively and implement Material Requirements Planning (MRP) for dependent demand systems.												K3			
CO5	Chair	ly principle n Managen	nent (SC)	M).			ΓQM) an	d unders	tand the	fundame	entals of S	upply	К3			
СО-РО	Mappi	ing (Scale	1: Low,	2: Medi	um, 3: I	High)			ıı.	-				, 		
CO-PO Mappin		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSC	
CO1		3	1	-	-	-	2	1	-	-	1	2	2	1		
CO2		3	3	3	1	2	2	2	-	-	1	1	3	2		
CO3		3	3	2	2	3	1	1	-	-	3	2	3	2		
CO4		3	3	2	1	3	1	1	-	-	3	1	3	2		
CO5		2	2	1	1	2	3	3	1	2	2	2	2	2		
Course		nts / Syllab	ous													
Introdu	ction t	to Operati	ions Mai	nagemer	nt: Defin		cope, im	portance,	, and his	storical e	volution o	-		-		
operatio producti Operati	ons in artion to sion to stone	to Operation organization organization ordanication ordanication ordanication order	ions Mar ion. Typo der, Defir global E	nagemer es and Ch nition and Cconomy	nt: Define haracteric de charace: Linkag	nition, so istics of Neteristics of ge with c	cope, imposed	portance, turing and e, classifi	, and his d Service ication o	storical e e System of service etitive pr	volution of s: Product e systems iorities (C	strategie	s, product lity, Deliv	igement. R ive system very, Flexib	type:	
Introdu operatio producti Operati Order qu location Operati	iction to so ion to so ions Strualifiers.	n organizati stock or ord crategy in a	ions Mar ion. Type der, Defir global E r winners	nagemer es and Ch nition and Cconomy s. Strategi	nt: Defin haracteri d charac : Linkag ic choice vity: Th	nition, so istics of M eteristics of ge with c es in oper	cope, imposed	portance, turing and e, classifi e strategy Global Sh erations 1	, and his d Service ication of Compeniate, Factor	storical e e System of service etitive pr or cost de	volution c s: Product e systems iorities (C eflation, D	strategie fost, Qual	s, product lity, Deliv Cchina, ne	ngement. R ive system very, Flexib w manufac	type: oility) cturin	
Introdu operatio producti Operati Order qu location Operati measure Module	iction to some in article some structural files some structural files some some in article some some some some some some some som	n organization or order trategy in grand order transgement and improvement of the transgement of the transgement of the transgement or	ions Marion. Typeder, Defir global Er winners	nagemer es and Ch nition and Cconomy s. Strategi Productive trategies.	nt: Define haracterid characteric characteric choice wity: The Factors to Design	nition, so istics of Moteristics of Moteristics of Moteristics of Moteristics of the mote	cope, imposed	portance, turing and e, classifi e strategy Global Sh erations 1 tivity.	, and his d Service ication o . Compe nift, Facto managen	storical e e System of service etitive pr or cost do ment, Sci	volution of s: Product e systems iorities (C eflation, D ietific Ma	strategie fost, Qual Decline of nagemen	s, product lity, Deliv china, ne t, Product	ngement. R ive system very, Flexib w manufact tivity Defi	types oility) eturin	
Introdu operatio producti Operati Order qu location Operati measure Module	iction to some in article some structural files some structural files some some in article some some some some some some some som	n organization organization or order trategy in a series and order transgements.	ions Marion. Typeder, Defir global Er winners	nagemer es and Ch nition and Cconomy s. Strategi Productive trategies. Product	nt: Define haracterid characteric characteric choice wity: The Factors to Design	nition, so istics of Moteristics of Moteristics of Moteristics of Moteristics of the mote	cope, imposed	portance, turing and e, classifi e strategy Global Sh erations 1 tivity.	, and his d Service ication o . Compe nift, Facto managen	storical e e System of service etitive pr or cost do ment, Sci	volution of s: Product e systems iorities (C eflation, D ietific Ma	strategie fost, Qual Decline of nagemen	s, product lity, Deliv china, ne t, Product	ngement. R ive system very, Flexib w manufact tivity Defi	type: oility) cturin	
Operation Operation Operation Operation Operation Operation Operation Module Product	ion to so ions in artion to so ions Statualifiers s. ions Mement, at 2 Design	n organization or order trategy in grand order transgement and improvement of the transgement of the transgement of the transgement or	ions Martion. Typeder, Defir global Er winners nt and Present stees, phases a to Fore	es and Charition and Conomy s. Strategion Productive trategies. Product s, concurrence ecasting:	nt: Defin haracteri d charac : Linkag ic choice vity: The Factors t Design rent Eng	nition, so istics of Moteristics of Moteristics of Moteristics of Moteristics of the desired period of the heritage and Forgineering, action to	Manufact of service corporate rations. Of ge of ope g produce recasting , Design Time-se	portance, curing and e, classific e strategy Global Sh erations a tivity.	, and his d Service ication of Compeniate, Factor managements, deceasts, E	storical e e System of service etitive pr or cost do ment, Sci	volution c s: Product e systems iorities (C eflation, D ietific Ma	strategie fost, Qual fost, Qual f	s, product lity, Deliv china, ne t, Product	rery, Flexible w manufactivity Defi	type: oility) cturin	
Introdu operatio producti Operati Order qu location Operati measure Module Product Forecast Forecast . Module	ion to so ions Stualifiers s. ions Mement, a 2 Design ting: Inting Errors 3	n organization organization organization order and order and improvementation organization organ	ions Marion. Typeder, Defir global Er winners nt and Prevenent stees, phases a to Fored Methods	es and Charition and Conomy S. Strategion Productive trategies. Product Product Example of the concurrence of the concurre	nt: Defin haracteri d charac : Linkag ic choice vity: The Factors t Design rent Eng Introdu casting,	nition, so istics of Meteristics of Meteristics of Meteristics of the desired period of	Manufact of service corporate rations. On the corporate ge of open generating produce recasting producer the corporate five Methods & Aggr	portance, turing and e, classific strategy Global Sherations attivity. for customeries fore ods of Foregate Plate	, and his d Service ication of the Compensation of the Compensatio	storical e e System of service etitive pr or cost de ment, Sci esign for a	volution of several volution of several volution of several volution of several volution, continued to the volution of several	dost, Qual dost, Qual decline of magemen magemen mability a	s, product lity, Deliv china, ne t, Product and assemb	rery, Flexible w manufactivity Defines B hours boly. 8 hours boly.	type	
Introdu operatio producti Operati Order qu location Operati measure Module Product Forecast Forecast . Module Invento	ions in artion to so ions Statualifiers s. ions Mement, a 2 Design ting: Inting Err	n organization organization organization order and order and improvement objective outroduction or, Causal anagement	ions Marcion. Typeder, Defir global Er winners and Present stores, phases a to Fore Methods	es and Chrition and Conomy s. Strategies. Productive trategies. Productive trategies. Productive trategies. Inventoruction to	nt: Define haracterid characterid characterid characterid choice wity: The Factors to Design rent Engular Introductions, of Inventor Inventor Control	nition, so istics of Meteristics of	Manufact of service corporate rations. Corporate ge of open ge produce recasting produce to the manufacture of the corporate to the corporate for the corporate of the corporate	portance, curing and e, classific strategy Global Sherations attivity. for customeries fore ods of Foregate Play, Various	managen mers, de ecasts, E precasting anning s costs i	storical e e System of service etitive pr or cost do ment, Sci esign for a extrapola g.	volution of services: Product esystems iorities (Ceflation, Definition of the control of the control of the central of the cen	cost, Qual cost, Qual pecline of magemen urability a ods, Extu	s, product lity, Deliv china, ne t, Product and assemble rapolative agement,	rery, Flexible w manufactivity Defines bly. methods, 8 hours EOQ Mod	type bility turin	
Introdu operatio producti Operati Order qu location Operati measure Module Product Forecast Forecast . Module Invento Inventor	ion to so ions in articles ions Statualifiers is. ions Management, at 2 Design ting: Inting Errory Management, at you Management, at you management in the state of the state	n organization organization organization order arategy in a sea and order and improvement objective or organization or	ions Martion. Typeder, Defir global Er winners nt and Present structure and Present structure. The structure are structured and the structure are structured as a structured as	es and Charition and Conomy S. Strategion Productive trategies. Product Example to the concurrence of force of the concurrence of the concurre	nt: Define haracterical characterical charac	nition, so istics of Moteristics of Moterial or Moterial	Manufact of service corporate rations. On the corporate rations. On the corporate recasting to the cor	portance, curing and e, classifications of tivity. Greater for custor for cu	managen mers, de ecasts, E precasting anning s costs in with Unc	storical e e System of service etitive pr or cost do ment, Sca esign for a extrapola g.	volution of serior Product ess: Product essystems iorities (Ceflation, Deflation, Deflation manufacturive methodes in invent pemand, N	cost, Qual cost, Qual decline of magemen magemen discelland	s, product lity, Deliv china, ne t, Product and assemble rapolative agement, eous Syst	rery, Flexible w manufactivity Define the soly. 8 hours bly. methods, 8 hours EOQ Moderns and leading to the solution of th	type bility cturin nition	
Introdu operatio producti Order qu location Operati measure Module Product Forecast Forecast Invento Inventor outputs Aggrega	ions in artion to so ions State alifiers s. ions Mement, at 2 Design ting: Inting Errory Marry Control MR ate Pla	n organization organization organization organization order and order and improvement objective introduction or or, Causal imagement in agement,	ions Marion. Typeder, Defir global Er winners and Provement states, phases a to Fored Methods Various apply Chanderstand ggregate	Productive trategies. Productive trategies. Productive trategies. Productive trategies. Productive trategies. Inventor uction to variation ain Manadding of Metallo and Sales a	nt: Define haracterical characterical charac	nition, so istics of Meteristics of Material and ERP.	Manufact of service corporate rations. C ge of ope g produce recasting t, Design Time-se tive Methol tentory N I Require	portance, turing and e, classific strategy Global Sherations attivity. for custor eries fore ods of Foregate Play, Various Models we ments Play	managen mers, de ecasts, E precasting anning s costs in with Unce	storical e e System of service etitive pr or cost de ment, Sci esign for a extrapola g.	volution of serior reservoir services (Constitute of services (Constitute of serior reservoir services (Constitute of services of services of services (Constitute of services	cost, Qual cost, Qual pecline of nagemen urability a ods, Exti	s, product lity, Deliv china, ne t, Product and assemb rapolative agement, eous Syst enefits of	gement. R ive system very, Flexit w manufact tivity Defi 8 hours oly. methods, 8 hours EOQ Mod tems and I MRP, Input	types bility, cturin nition dels c	

Course Name: Operations Management

Course Objectives: students with fundamental concepts and principles of operations management, enabling them to



(An Autonomous Institute)
School of Mechanical Engineering

Evolution of Quality Management, Modern Quality Management, Total Quality Management, Statistical Concepts in Quality Control, Introduction to Acceptance Sampling, QC Tool, Introduction to Six Sigma, Quality Function Deployment, Quality issues in Services Nature of Quality,

Introduction to Maintenance Management, Types of maintenance, Total Productive Maintenance, Introduction to Project Management

Module 5Process analysis and supply chain strategy8 hoursIntroduction to Process analysis, Job Design and work Measurement, Manufacturing Process selection and Design, Service Process

Introduction to Process analysis, Job Design and work Measurement, Manufacturing Process selection and Design, Service Process Selection and Design, Business process Reengineering.

Supply Chain Strategy, Measuring Supply Chain performance, Case discussion of Supply Chain Management, Contemporary Issues in Operations management, Framework for Operations Strategy Formulation

Supply Chain Management (SCM): Introduction to SCM, objectives, and importance. Supply chain drivers. Recent trends in SCM (Resilience, Digitalization, Sustainability).

		Total Lecture Hours 40 hours				
Textbook	•					
S.No	Book Title with publication agency & year	Author				
1	Operations Management: Processes and Supply Chains	Lee J. Krajewski, Manoj K. Malhotra,				
		Larry P. Ritzman				
2	Operations Management	ay Heizer, Barry Render, Chuck				
		Munson				
3						
Refe	ence Books:					
S.No	Book Title with publication agency & year	Author				
1	Production and Operations Management	S.N. Chary				
2	Operations Management: Theory and Practice	B. Mahadevan				
3						
NPTEL/	Youtube/ Faculty Video Link:					
Module 1	http://www.youtube.com/watch?v=nmDg3chbNVs					
Module 2	http://www.youtube.com/watch?v=KaIPe5pUVbc					
Module 3	http://www.youtube.com/watch?v=MbNmIZNy3qI					
Module 4	What is the Material Requirement planning (MRP)? MRP Process					
Module 5	Operations & Supply Chain Management: Quality Management					

TA* - Teacher Assessment marks on the basis of defined Teaching Methodologies like Quiz, Assignment, Video Assignment, Seminar, Group discussion, PBL or any other defined by respective faculty members and may vary to subject-wise and faculty-wise