



NEW HORIZON COLLEGE OF ENGINEERING

New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA



Batch of 2021-2025 (As per NEP)
BE – Mechanical Engineering

First to Eighth Semesters B.E

SCHEME and SYLLABUS

New Horizon College of Engineering

Department of Mechanical Engineering

First Semester Scheme (Chemistry Cycle)

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MAT11A	Applied Mathematics-I	AS	3	1	0	0	4	5	50	50	100
2	21CHE12A	Engineering Chemistry	AS	2	1	0	0	3	4	50	50	100
3	21CSE13A	Problem solving using Python	CSE	2	1	0	0	3	4	50	50	100
4	21MEE14A	Computer Aided Engineering Drawing	ME	2	0	1	0	3	4	50	50	100
5	21ECE15A	Basic Electronics	ECE	2	1	0	0	3	4	50	50	100
6	21CHL16A	Engineering Chemistry Lab	AS	0	0	1	0	1	2	50	50	100
7	21CSL17A	Problem solving using Python Lab	CSE	0	0	1	0	1	2	50	50	100
8	21AEC11A	Communicative English	HSS	0	0	1	0	1	2	50	50	100
9	21AEC13A	Political Science	HSS	1	0	0	0	1	1	50	50	100
Total								20	28	450	450	900

Second Semester Scheme (Physics Cycle)

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MAT21A	Applied Mathematics -II	AS	3	1	0	0	4	5	50	50	100
2	21PHY22A	Engineering Physics	AS	2	1	0	0	3	4	50	50	100
3	21MEE23A	Elements of Mechanical Engineering	ME	2	1	0	0	3	4	50	50	100
4	21CIV24A	Elements of Civil Engineering	CV	2	1	0	0	3	4	50	50	100
5	21EEE25A	Basic Electrical Engineering	EE	2	1	0	0	3	4	50	50	100
6	21PHL26A	Engineering Physics Lab	AS	0	0	1	0	1	2	50	50	100
7	21EEL27A	Basic Electrical Engineering Lab	EE	0	0	1	0	1	2	50	50	100
8	21AEC21A	Professional Writing Skills in English	HSS	0	0	1	0	1	2	50	50	100
9	21AEC22A	Entrepreneurship Development-I	MBA	1	0	0	0	1	1	50	50	100
Total								20	28	450	450	900

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Third Semester Scheme

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE31A	Applied Mathematics-III	AS	2	1	0	0	3	4	50	50	100
2	21MEE322 A	Computer Aided Machine Drawing	ME	1	0	1	0	2	3	50	50	100
3	21HSS332A / 21HSS333A	Aadalitha Kannada /Vyavaharika Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS342A	Environmental Science	HSS	1	0	0	0	1	1	50	50	100
5	21MEE35A	Fluid Mechanics and Hydraulic Machines.	ME	2	1	0	0	3	4	50	50	100
6	21MEL35A	Fluid Mechanics and Hydraulic Machines Lab	ME	0	0	1	0	1	2	50	50	100
7	21MEE36A	Manufacturing Technology	ME	2	1	0	0	3	4	50	50	100
8	21MEL36A	Manufacturing Technology Lab	ME	0	0	1	0	1	2	50	50	100
9	21MEE37A	Mechanical Measurements and Metrology	ME	2	1	0	0	3	4	50	50	100
10	21MEL37A	Mechanical Measurements and Metrology Lab	ME	0	0	1	0	1	2	50	50	100
11	21MEE38A	Mini Project	ME	0	0	2	0	2	4	50	50	100
Total								21	31	550	550	1100

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Fourth Semester Scheme

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE41A	Applied Mathematics-IV	AS	2	1	0	0	3	4	50	50	100
2	21HSS421A	Life Skills for Engineers	HSS	1	0	1	0	2	3	50	50	100
3	21HSS431A	Entrepreneurship Development -II	HSS	1	0	0	0	1	1	50	50	100
4	21HSS441A	Constitution of India & Professional Ethics	HSS	1	0	0	0	1	1	50	50	100
5	21MEE45A	Engineering Thermodynamics	ME	2	1	0	0	3	4	50	50	100
6	21MEL45A	Engineering Thermodynamics Lab	ME	0	0	1	0	1	2	50	50	100
7	21MEE46A	Mechanics of Materials	ME	2	1	0	0	3	4	50	50	100
8	21MEL46A	Mechanics of Materials Lab	ME	0	0	1	0	1	2	50	50	100
9	21MEE47A	Material Science & Metallurgy	ME	2	1	0	0	3	4	50	50	100
10	21MEL47A	Simulation Lab	ME	0	0	1	0	1	2	50	50	100
11	21MEE48A	Summer Internship-I #	ME	0	0	0	2	2	0	100	--	100
Total								21	27	600	500	1100

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Department of Mechanical Engineering

Lateral Entry Students

Sl. No	Course Code	Course	BoS	Credit Distribution					Overall Credits	Contact Hours	Marks		
				L	T	P	S				CIE	SEE	Total
1	21DMAT31A	Basic Applied Mathematics - 1	AS	0	0	0	0		0	2	50	50	100
2	21DAEC40A	Communicative English	HSS	0	0	0	0		0	2	50	50	100
3	21DMAT41A	Basic Applied Mathematics - 2	AS	0	0	0	0		0	2	50	50	100

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Fifth Semester Scheme

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE51A	Machine Theory & Mechanism Design	ME	2	1	0	0	3	4	50	50	100
2	21MEE52A	Finite Element Methods	ME	2	1	0	0	3	4	50	50	100
3	21MEE53XA	Profession Elective-I	ME	2	1	0	0	3	4	50	50	100
4	21MEE54XA	Profession Elective-II	ME	2	1	0	0	3	4	50	50	100
5	21MEE55A	Research Methodology & Intellectual Property Rights (AEC)	ME	2	0	0	0	2	2	50	50	100
6	21MEE56A	Domain Based AEC (Mechatronics)	ME	2	0	0	0	2	2	50	50	100
7	21MEL51A	Machine Theory & Mechanism Design Lab		0	0	1	0	1	2	50	50	100
8	21MEL52A	Finite Element Methods Lab		0	0	1	0	1	2	50	50	100
9	21XXX57A/67A	Physical Education	P.Ed	0	0	0	0	0	2	50	50	100
10	21MEE58A	Mini Project	ME	0	0	2	0	2	4	50	50	100
Total								20	30	500	500	1000

Professional Elective-I (Management Domain)

Sl. No.	Course Code	Course Name
1	21MEE541A	Operations Research
2	21MEE542A	Management & Entrepreneurship
3	21MEE543A	Introduction to Project and Finance Management
4	21MEE544A	Production and Operations Management
5	21MEE545A	Statistical Quality Control

Professional Elective-II (Automation Domain)

Sl. No.	Course Code	Course Name
1	21MEE541A	Industrial Robotics
2	21MEE542A	Computer Integrated Manufacturing
3	21MEE543A	Fundamentals of Sensors and Actuators
4	21MEE544A	Industrial Automation
5	21MEE545A	Control Engineering

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Sixth Semester Scheme												
Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE61A	Fundamentals of Heat Transfer	ME	2	1	0	0	3	4	50	50	100
2	21MEE62A	Machine Design	ME	2	1	0	0	3	4	50	50	100
3	21MEE63XA	Professional Elective-III	ME	2	1	0	0	3	4	50	50	100
4	21MEE64XA	Professional Elective-IV	ME	2	1	0	0	3	4	50	50	100
5	21NHOP6XXA	Open Elective-I	ALL	3	0	0	0	3	4	50	50	100
6	21MEL61A	Fundamentals of Heat Transfer Lab	ME	0	0	1	0	1	2	50	50	100
7	21MEL62A	Computer Integrated Manufacturing Lab	ME	0	0	1	0	1	2	50	50	100
8	21MEE66A	Summer Internship-II#	ME	0	0	0	3	3	0	50	50	100
9	21XXX57A/67A	Physical Education	P.Ed	0	0	0	0	0	2	50	50	100
Total								20	26	450	450	900

4 Weeks Summer Internship – II (After 4th semester, which will be evaluated in 6th semester)

Professional Elective-III (Hybrid & Electric Vehicles Domain)		
Sl. No.	Course Code	Course Name
1	21MEE641A	Emerging Automotive Technologies
2	21MEE642A	Introduction to Hybrid Electric Vehicles
3	21MEE643A	Electric Vehicle Charging Innovations
4	21MEE644A	Hybrid Electrical Vehicle Design
5	21MEE645A	Battery Management System

Professional Elective-IV (Digital Manufacturing Domain)		
Sl. No.	Course Code	Course Name
1	21MEE641A	Smart Manufacturing
2	21MEE642A	Digital Fabrication
3	21MEE643A	Additive Manufacturing
4	21MEE644A	Smart Materials and Intelligent system Design
5	21MEE645A	Product Life Cycle Management

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Seventh Semester Scheme												
Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE71XA	Professional Elective-V	ME	2	1	0	0	3	4	50	50	100
2	21MEE72XA	Professional Elective-VI	ME	2	1	0	0	3	4	50	50	100
3	21NHOP7XXA	Open Elective-II	ALL	3	0	0	0	3	3	50	50	100
4	21NHOP7XXA	Open Elective-III	ALL	3	0	0	0	3	3	50	50	100
5	21MEE75A	Project Work	ME	0	0	10	0	10	20	200	200	400
Total								22	34	400	400	800

Professional Elective-V (Energy & Power Domain)		
Sl. No.	Course Code	Course Name
1	21MEE711A	Renewable Energy & Applications
2	21MEE712A	Energy Management & Auditing
3	21MEE713A	Energy Production, Distribution & Safety
4	21MEE714A	Energy Economics and Policy
5	21MEE715A	Energy & Environment

Professional Elective-VI (Artificial Intelligence & Machine Learning Domain)		
Sl. No.	Course Code	Course Name
1	21MEE721A	Introduction to AI and ML
2	21MEE722A	Introduction to Python for AI and Development Project
3	21MEE723A	Introduction to Data Analytics
4	21MEE724A	Introduction to IOT
5	21MEE725A	Introduction to Scientific Computing Language

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Eighth Semester Scheme

Sl. No.	Course Code	Course Name	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21MEE81A	Technical Seminar	ME	0	1	0	0	1	2	50	50	100
2	21MEE82A	Research / Industry Internship #	ME	0	0	0	15	15	-	200	200	400
Total								16	2	250	250	500

24 Weeks Research/Industry Internship (After 6th semester/7th semester, which will be evaluated in 8th semester) It is to be evaluated on regular basis and Attendance certificate is Mandatory for 24 weeks

List of Open Electives (for 160 credits scheme)

Sl. No.	Course Code	Course Name
1	21NHOP601/701	Big Data Analytics using HP Vertica-1
2	21NHOP602/702	VM Ware Virtualization Essentials-1
3	21NHOP604/704	Big Data Analytics using HP Vertica-2
4	21NHOP605/705	VM Ware Virtualization Essentials-2
5	21NHOP607/707	SAP
6	21NHOP608/708	Schneider - Industrial Automation
7	21NHOP609/709	CISCO- Routing and Switching - 1
8	21NHOP610/710	Data Analytics
9	21NHOP611/711	Machine Learning
10	21NHOP612/712	CISCO- Routing and Switching - 2
11	21NHOP613/713	IIOT- Embedded System
12	21NHOP614/714	Block Chain
13	21NHOP615/715	Product Life Cycle Management
14	21NHOP617A/717A	Network Security and Cryptography
15	21NHOP618A/718A	Physical Design
16	21NHOP619A/719A	AI Data Analysis with Python

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COURSE / CREDIT DISTRIBUTION

Batch of 2021-2025

(As per NEP)

Course Category	Courses Semester Wise								Total Courses	Total Credits
	I	II	III	IV	V	VI	VII	VIII		
Basic Science Courses	2	2	1	1					6	20
Basic Science Lab Courses	1	1							2	2
Engineering Science Courses	3	3							6	18
Engineering Science Lab Courses	1	1							2	2
Humanities, Social Sciences & Management Courses	2	2	2	2					8	8
Professional Core Courses			3	3	2	2			10	30
Professional Core Lab Courses			3	3	2	2			10	10
Professional Elective Courses					2	2	2		6	18
Open Electives						1	2		3	9
Ability Enhancement Courses			1	1	2				4	8
Skill Courses (Projects)			1		1		1		3	14
Skill Courses (Internship)				1		1		1	3	20
Skill Courses (Seminars)								1	1	1
Mandatory Courses (UGC/AICTE/UHV)					1				1	0
TOTAL COURSES	9	9	11	11	10	8	5	2	65	
TOTAL CREDITS	20	20	21	21	20	20	22	16		160

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THIRD SEMESTER SYLLABUS

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COMPUTER AIDED MACHINE DRAWING

Course Code	21MEE322A
L: T: P: S	1:0:1:0
Exams Hours	03

Credits	02
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE322A.1	Understand the orientation and sections of solids in different views.
21MEE322A.2	Construct models for thread forms, fasteners and simple assemblies.
21MEE322A.3	Familiarize the students with Indian Standards on drawing practices, production of 2 D drawings.
21MEE322A.4	Relate the limits, fits and tolerance on component dimensions along with GD&T.
21MEE322A.5	Impart knowledge on 3D surface models using CAD software.
21MEE322A.6	Explore different types of assembly constraints and create 3D assembly of machine components using advanced CAD software.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2
21MEE322A.1	3													
21MEE322A.2	3													
21MEE322A.3	3	1												
21MEE322A.4	3											2		
21MEE322A.5	3	1	2		2							2		
21MEE322A.6	3	1	2		2							2		

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) 'Machine Drawing', K.R. Gopala Krishna, Subhash Publication, 2017, ISBN-139789383214235
- 2) 'Machine Drawing' N. D. Bhat, V M Panchal, Charotar Publication House, 2014, ISBN: 9789385039232, 9385039237

REFERENCE BOOKS:

- 1) 'Machine Drawing with Auto CAD', Goutam Pohit & Goutham Ghosh, 1st Indian print Pearson Education, 2005, ISBN: 13-978-8131706770
- 2) 'Machine Drawing', N. Siddeshwar, P. Kanniah, V.V.S. Sastri, published by Tata McGraw Hill, 2014, ISBN: 007460337X / 9780074603376
- 3) 'Machine Drawing' Junnarkar N. D., Pearson Education, 2007, ISBN 8131706788, 9788131706787
- 4) 'Textbook of Machine Drawing' K. C. John, PHI, 2009, 1st Edition, ISBN-13 : 978-8120337213
- 5) 'A Textbook of Machine Drawing' P. S. Gill, S.K. Kataria & Sons, 2013 Edition, ISBN-13 : 978-9350144169
- 6) 'A Textbook of Machine Drawing' R. K. Dhawan, S. Chand, 2nd Revised Edition 2006

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ADDITIONAL READING:

Bureau of Indian Standards (BIS): SP-46, 2003

NPTel Web Course: <https://nptel.ac.in/courses/112103019/>

NPTel Video Course: <https://nptel.ac.in/syllabus/112106075/>

Syllabus

Module No	Module Contents	Hrs	COs
1	<p>Sections of Solids: Sections of Pyramids, Prisms, Cubes, Tetrahedrons, Cones and Cylinders resting only on their bases (No problems on axis inclinations, spheres and hollow solids), True shape of sections</p> <p>Thread Forms & Fasteners: Thread terminology, Popular forms of screw threads, simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, counter sunk head screw, grub screw, Allen screw</p>	6	21MEE322A.1 21MEE322A.2
2	<p>Introduction to 2d drafting:</p> <p>Couplings: Flange, Universal, Oldham's, Muff, Gear couplings</p> <p>Joints: Knuckle, Gib & cotter, strap, sleeve & cotter joints</p> <p>Keys & Joints: Parallel key, Taper key, Feather key, Gibhead key and Woodruff key</p>	6	21MEE322A.3
3	<p>Geometric dimensioning and tolerance: Introduction to limits, fits and tolerances, dimensional and geometric tolerances, surface finish symbols. Practical examples using industrial drawings</p>	3	21MEE322A.4
4	<p>Surface modelling: Generation of 3-D sheet metal model involving 5 to 6 operations, Tray, Jug, Funnel, Transition pieces, Petrol/diesel measuring can etc.</p>	10	21MEE322A.5
5	<p>3D Geometric modeling and assembly: (Part drawings should be given)</p> <p>Machine components – Screw jack (Bottle type), Plummer block (Pedestal Bearing), Machine vice, I.C. Engine connecting rod, Rams Bottom Safety Valve, Tailstock of lathe, Tool Head of a shaper</p>	15	21MEE322A.6

Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Report
Marks	25	15	10
Remember	4		
Understand	4		
Apply	6	3	5
Analyze	8	7	5
Evaluate	3	5	
Create			

SEE (50 Marks – Theory/Lab)

Bloom's Category	Tests (theory)
Remember	8
Understand	7
Apply	10
Analyze	15
Evaluate	5
Create	5

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FLUID MECHANICS AND HYDRAULIC MACHINES

Course Code	21MEE35A
L: T: P:S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE35A.1	Understand the properties of fluids and Compute the parametric behaviour when acting on simple aerodynamic profiles and shapes in steady fluid flows.
21MEE35A.2	Understand the various losses for fluids flowing through a pipe and Implement the concepts of fluid statics, fluid kinematics and fluid dynamics in the applications of Hydraulics machinery.
21MEE35A.3	Analyze the types of fluid flow, different flow description and design a flow measuring device to analyze the discharge of fluid.
21MEE35A.4	Determine various equipment sizing / design aspects of turbo machines based on engineering requirement with the application of Continuity and Bernoulli's equations in order to develop solution for fluid flow process.
21MEE35A.5	Investigate the concepts as a member of a team and make an effective presentation on the application of suitable turbo machines under / within the specified conditions.
21MEE35A.6	Design and analysis of turbo machines by applying the knowledge to practical engineering problems for better sustainable solutions and staying updated with the latest developments.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
21MEE35A.1	3	3												3
21MEE35A.2	3	3												3
21MEE35A.3	3	3	3										3	3
21MEE35A.4	3												3	
21MEE35A.5									1	1				
21MEE35A.6	3	3	3									1	3	

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) Ferdinand Beer & Russell Johnston., 'Mechanics of Materials', McGraw Hill India, 8th Edition, 2020, ISBN- (13 digits): 9789390219421.
- 1) Ramamrutham S., 'Strength of Materials', Dhanpat Rai Publishing Co Pvt Ltd, 18th Edition, 2014, ISBN- (13 digits): 9789384378264; ISBN-(10 digits): 9384378267.,

REFERENCE BOOKS:

- 2) R C Hibbeler., 'Mechanics of Materials', Pearson Education, 10th Edition, ISBN-(13 digits): 978-0134319650; ISBN-(10 digits): 0134319656.
- 3) James M. Gere, Barry J. Goodno., 'Mechanics of Materials', Cengage Learning, 9th Edition, 2018, ISBN- (13 digits): 9789353502478.
- 4) S S Rattan., 'Strength of Materials', McGraw Hill India, 3rd Edition, 2016, ISBN-(13 digits): 9789385965517; ISBN-(10 digits): 9385965514

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Syllabus

Module No	Module Contents	Hrs	COs
1	<p>Fluid Properties and Fluid Statics: Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Surface Tension, Capillarity, Compressibility, Vapour pressure: Pascal's law, Hydrostatic law (No numerical).</p> <p>Buoyancy: Buoyancy, centre of buoyancy, Archimedes' principle, metacentre and meta centric height, stability of floating and submerged bodies, determination of Meta centric height by experimental method. (Numerical on Meta centre and centre of Buoyancy)</p>	8	<p>21MEE35A.1</p> <p>21MEE35A.2</p>
2	<p>Fluid Kinematics: Types of Flow, Types of flow lines, Continuity equation in 3D (Cartesian Co-ordinates only), velocity and acceleration, velocity potential function and stream function (Numerical).</p> <p>Fluid Dynamics: Euler equation of motion along and Bernoulli's equation from Euler's equation (Numerical). Application of Bernoulli's equation to Pitot tube, venture meter, orifice meter (No Derivation of discharge equation).</p>	8	<p>21MEE35A.2</p> <p>21MEE35A.3</p> <p>21MEE35A.4</p>
3	<p>Flow Through Pipes: Energy losses through pipe, Major losses, Darcy- Weisbach equation, Chezy's Equation, Minor losses in pipes- sudden enlargement, sudden contraction (Numerical).</p> <p>Laminar And Turbulent Flow: Definition, Relation between pressure and shear stresses, Laminar flow through circular pipe, Fixed parallel plates, Turbulent flow and velocity distribution. (Numerical)</p>	8	<p>21MEE35A.2</p> <p>21MEE35A.3</p> <p>21MEE35A.4</p>
4	<p>Hydraulic pumps & prime movers</p> <p>Pumps</p> <p>Concept and classification of pumps, Detailed study (construction, working and applications) of Centrifugal pump, Reciprocating pump, Submersible pump, Rotary positive displacement type pumps like Gear pump and Van pump, Vacuum pump. Performance (efficiency, discharge, head, specific speed and power consumption) of centrifugal pump and reciprocating pump with simple numerical example. Characteristic curves of centrifugal pump and reciprocating pump, Need for priming of centrifugal pump & Selection of pumps</p>	8	<p>21MEE35A.4</p> <p>21MEE35A.5</p> <p>21MEE35A.6</p>
5	<p>Turbine</p> <p>Classification, construction, Design, working principle and applications of: Pelton wheel, Francis's turbine, Kaplan turbine & Selection criteria of prime movers. Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Hydraulic systems hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages, limitations and applications.</p>	8	<p>21MEE35A.4</p> <p>21MEE35A.5</p> <p>21MEE35A.6</p>

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Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Quizzes
Marks	25	15	10
Remember	4		
Understand	4		
Apply	6	3	5
Analyze	8	7	5
Evaluate	3	5	
Create			

SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
Remember	8
Understand	7
Apply	15
Analyze	15
Evaluate	5
Create	

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FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Course Code	21MEL35A
L: T: P:S	0:0:1:0
Exams Hours	02

Credits	01
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEL35A.1	Calibrate flow measuring devices such as Venturi meter, orifice meter and Notches and predict the coefficient of discharge for flow through pipes
21MEL35A.2	Estimate the friction and measure the frictional losses in fluid flow
21MEL35A.3	understand the fuel properties like viscosity and its measurements using various types of measuring devices and also Analyze different types of fluid flow by using Reynold's apparatus
21MEL35A.4	Understand the knowledge of impact of jet on various types of vanes and performance of hydraulic turbine and pumps under different working conditions

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21MEL35A.1	3	3	3	3									3	
21MEL35A.2	3	3	3	3									3	
21MEL35A.3	3	3	3	3									3	
21MEL35A.4	3	3	3	3									3	

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXTBOOKS :

- 1) P.N.Modi and Seth, "Fluid Mechanics and Hydraulic Machines", 22nd edition, Standard Book House, 2018.
- 2) Bansal R.K., "Fluid Mechanics and Hydraulic Machines", 9th edition, Laxmi Publications (P)Ltd., New Delhi, 2018.

REFERENCEBOOKS :

- 1) R.K.Rajput, "A Text Book of Fluid Mechanics and Hydraulic Machines", 6th edition, S. Chand, 2015.
- 2)Yunus A. Cengel and John M. Cimbala., 'Fluid Mechanics', McGraw Hill, 4th Edition, 2017, ISBN-(13 digits): 978-9385401374.

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Syllabus

Exp. No.	Contents of Experiment	Hrs	COs
1.	Determination of viscosity of given lubricating oil using Saybolt / Redwood / Torsion Viscometer.	2	21MEL35A.3
2.	Calibration of given Venturi meter, Orifice meter and plotting the suitable calibration curve	2	21MEL35A.1
3.	Calibration of given V-notch, Rectangular and plotting the suitable calibration curve	2	21MEL35A.1
4.	Determination of coefficient of friction and Chezy's constant for turbulent flow in pipes.	2	21MEL35A.2
5.	Determination of minor losses coefficient in flow through pipes due to sudden contraction and sudden expansion.	2	21MEL35A.2
6.	Determination of the Reynolds Number and hence the Type of Flow using the Reynolds apparatus	2	21MEL35A.3
7.	To determine the impact of jet on hemispherical vanes, Flat Vanes and Inclined Vanes	2	21MEL35A.4
8.	To determine the performance characteristics of Single Stage & Multi stage centrifugal pump.	2	21MEL35A.4
9.	To determine the performance characteristics of reciprocating pump	2	21MEL35A.4
10.	To find the performance test on Pelton Wheel	2	21MEL35A.4
11.	To find the performance test on Francis's turbine	2	21MEL35A.4

Assessment Pattern

CIE (50 Marks – Lab)

Bloom's Category	Experiments / Tests	Record	Viva
Marks	20	20	10
Remember			2
Understand			2
Apply			2
Analyze	10	8	2
Evaluate	10	8	2
Create		4	

SEE (50 Marks – Lab)

Bloom's Category	Test
Remember	4
Understand	4
Apply	2
Analyze	20
Evaluate	20
Create	

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MANUFACTURING TECHNOLOGY

Course Code	21MEE36A
L: T: P: S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE36A.1	Select the suitable moulding and casting processes
21MEE36A.2	Emphasize various concepts of forging and joining techniques for required materials.
21MEE36A.3	Analyze the tool life and tool failure during machining process
21MEE36A.4	Select the appropriate machine tools and machining operations to manufacture the components
21MEE36A.5	Index the number of divisions on the work using various indexing techniques during gear cutting operations
21MEE36A.6	Investigate on special Moulding processes & Machines

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21MEE36A.1	3	3												3
21MEE36A.2	3													3
21MEE36A.3	3	3												3
21MEE36A.4	3	3											2	
21MEE36A.5	3	3											2	3
21MEE36A.6	3	3											2	

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) Manufacturing Process-I, Dr.K.Radhakrishna, Sapna Book House, 5th Revised Edition 2017.ISBN:978-8128002076
- 2) Manufacturing & Technology: Foundry Forming and Welding”, P.N. Rao, Volume1.Tata McGrawHill Education Private Limited, 2018, ISBN 13:978-9353160517
- 3) Principles of metal casting, R.W Heine, C.R. Loyer, McGraw Hills Pvt limited ,2017 ISBN:978-0070993488
- 4) Hazara Choudhry, ‘Work shop Technology’, Vol – II, Media promoters and publishers Pvt. Ltd. 2018, ISBN9788185099156
- 5) R.K.Jain, ‘Production Technology’, Khanna Publishers-Delhi , 2017, ISBN:9788174090997

REFERENCE BOOKS:

- 1) Process and Materials of Manufacturing, Roy A Lindberg, Pearson Edu, 4thEd. 2015, ISBN-13:978- 9332556973.
- 2) Manufacturing Technology, Serope Kalpakjian, Steven. R. Schmid, Pearson Education Asia, 7thEd. 2018, ISBN -13:978-9810694067.
- 3) Manufacturing Process-III, Dr.K.Radhakrishna, Sapna Book House, 5th Revised Edition 2018,ISBN:9788128010439
- 4) G.Boothroyd , ‘Fundamentals of Metal machining and machine tools’, McGraw Hill, 2015, ISBN:978- 1574446593

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- 5) HMT, 'Production Technology', HMT, Tata McGraw Hill, 2017. ISBN:978-0070964433
- 6) Hienrich Gerling, Karl H Heller, 'All about machine tools', 2nd Edition, New Age publishers, 2016, ISBN: 9780852263105
- 7) P. N. Rao, 'Manufacturing Technology', Vol I & II, 4th edition, Tata McGraw Hill publication, New Delhi, 2018, ISBN: 978-1259029561

Syllabus

Module No	Module Contents	Hrs	COs
1	<p>Casting by Moulding sand: Introduction to Casting process& steps involved. Mixture ingredients for different sand mixtures. Method used for sand moulding, such as Greensand, dry sand and skin dried moulds.</p> <p>Patterns & Cores: Definition, Need, Types, Material. Method of making patterns, cores, Binders & additives used in sand moulding. Concept of Gating & Risers: Principle and types.</p> <p>Casting defects: Types & methods to avoid</p>	8	21MEE36A.1
2	<p>Special moulding Process: Study of important moulding processes, No bake moulds, Flask less moulds, Sweep mould, CO2 mould, Shell mould, Investment mould. Metal moulds: Gravity die-casting, Pressure die casting, Centrifugal casting, Squeeze Casting, Slush casting, Thixo-casting and Continuous Casting Processes. Moulding Machines: Jolt type, Squeeze type, Jolt & Squeeze type and Sand slinger, classifications of Melting Furnaces.</p>	8	21MEE36A.6
3	<p>Theory of metal cutting: Single point cutting tool nomenclature, types of metal cutting, Mechanism of chip formation, types of chips. Tool wear and tool failure, tool life. Effects of cutting parameters on tool life. Tool failure criteria, Taylors tool life equations, numericals on tool life.</p> <p>Turning (lathe): classifications, Work holding devices, constructional features of turret and capstan lathe, tool layout.</p> <p>Milling machines: classification, constructional features, milling cutters nomenclature, milling operations, up milling and down milling concept. Various milling operations, Indexing: simple, compound, differential and angular indexing calculations</p> <p>Drilling machine: classification, constructional features, drilling & related operations. Types of drill & drill bit nomenclature, drill materials, reaming, boring, tapping</p>	10	21MEE36A.3 21MEE36A.4 21M EE36A.5
4	<p>Welding process: Principle of welding, classification, application advantages and disadvantages, welding terminology, edge preparation.</p> <p>Arc welding: Arc welding process, Metal arc welding(MAW) or Flux shielded metal arc welding(FSMaw), Tungsten inert gas welding(TIG), Metal inert gas welding(MIG), Submerged arc welding(SAW), Atomic hydrogen welding(AHW).</p> <p>Soldering and Brazing: Surface cleaning and soldering flux,</p>	8	21MEE36A.2

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	Types of soldering, advantages and disadvantages, types of brazing, advantages and disadvantages.		
5	Forging: Introduction, Classification of forging processes. Forging machines & equipment. Forging pressure and load in open die forging and closed die forging, concepts of friction hill and factors affecting it. Die- design parameters. Material flow lines in forging. Forging defects, Residual stresses in forging. Advantages and disadvantages of forging. Simple problems.	6	21MEE36A.2

Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Quizzes
Marks	25	15	10
Remember	5		
Understand	5	5	5
Apply	5	5	5
Analyze	5	5	
Evaluate	5		
Create			

SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
Remember	10
Understand	20
Apply	10
Analyze	5
Evaluate	5
Create	

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MECHANICAL MEASUREMENTS & METROLOGY

Course Code	21MEE37A
L: T: P: S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE37A.1	Apply the concepts of metrology to identify the suitable standards for calibrating the end bars
21MEE37A.2	Design the gauges for engineering components using the concepts of Limits, fits, geometric dimensioning and tolerances (GD&T)
21MEE37A.3	Analyze the working principle of various linear and angular measuring instruments
21MEE37A.4	Analyze the various types of screw threads and gear tooth used in various applications and its measuring instruments
21MEE37A.5	Assess the surface finish on the components using various methods
21MEE37A.6	Identify appropriate measuring instruments for measurement of force, torque, pressure, temperature and strain

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2
21MEE37A.1	3	3												3
21MEE37A.2	3	3	1											3
21MEE37A.3	3	3											2	3
21MEE37A.4	3	3												3
21MEE37A.5	3	3												3
21MEE37A.6	3	3												3

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) R.K. Jain, 'Engineering Metrology', Khanna Publishers, 2022, edition 22, ISBN-13: 978-8174091536.
- 2) Beckwith Marangoni and Lienhard, 'Mechanical Measurements', Pearson Education, 7th Edition, 2015, ISBN 13: 978-8131717189.
- 3) Dr. T Chandrashekar, 'Metrology and Measurement', Subhas publication, 2017, ISBN: 9789383214198.

REFERENCE BOOKS:

- 1) I.C. Gupta, 'Engineering Metrology', Dhanpat Rai Publications, Delhi, 8th Edition, 2018, ISBN 13: 9788189928452.
- 2) R.K. Jain, 'Mechanical and Industrial Measurements', Khanna Publishers, 2008, ISBN: 9788174091918.
- 3) Anand K. Bewoor & Vinay A. Kulkarni, 'Metrology & Measurement', Tata McGraw Hill Pvt. Ltd., New Delhi, 2009, ISBN: 9781259081323.
- 4) N V Raghavendra and Krishnamurthy, 'Engineering Metrology and Measurement', Oxford University Press, 2013, ISBN: 9780198085492.

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Syllabus

Module No	Module Contents	Hrs	COs
1	<p>Standards of measurement: Definition and Objectives of metrology, Material Standards-International Prototype meter, Imperial standard yard, Airy points, Wave length standard, subdivision of standards, line and end standard, calibration of end bars, Indian Standards (M-87, M- 112) of Slip gauges, wringing phenomena, Numerical problems on building of slip gauges.</p> <p>Measurements and measurement systems: Generalized measurement system, basic definitions, Errors in measurement, classification of errors.</p>	8	<p>21MEE37A.1 21MEE37A.3</p>
2	<p>Limits, Fits, Tolerance and Gauge: Definition of tolerance, Specification in assembly, Principle of interchangeability and selective assembly limits of size, Indian standards, concept of limits of size and tolerances, compound tolerances, accumulation of tolerances, definition of fits, types of fits and their designation (IS 919-1963), geometrical tolerance, hole basis system, shaft basis system, classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, and gauge materials.</p>	8	21MEE37A.2
3	<p>Comparators: Introduction to comparators, characteristics, classification of comparators, Johnson's Mikrokator, Sigma comparator, Dial gauge, Ziess ultra-optimeter LVDT, Solex pneumatic gauge.</p> <p>Angular measurements: Bevel protractor, sine principle and use of sine bars, sine centre, angle gauges, numerical on building of angles using angle gauges.</p>	8	21MEE37A.3
4	<p>Surface metrology: Terminology of surface roughness, Methods of measuring surface finish, Analysis of surface traces.</p> <p>Form Measurement: Terminology of screw threads, measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2-wire and 3-wire methods, best size wire. Tool maker's microscope, gear tooth terminology, gear tooth vernier caliper.</p>	8	<p>21MEE37A.4 21MEE37A.5</p>
5	<p>Measurement of force, torque, pressure: Principle of analytical balance, platform balance, proving ring. Torque measurement- Prony brake, hydraulic dynamometer. Pressure measurements- McLeod gauge, Pirani gauge.</p> <p>Measurement of Temperature and strain: Resistance thermometers, thermocouple, law of thermo couple, Strain measurements, electrical strain gauge.</p>	8	21MEE37A.6

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Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Quizzes
Marks	25	15	10
Remember	5	5	
Understand	5	5	5
Apply	10	5	5
Analyze	5		
Evaluate			
Create			

SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
Remember	5
Understand	5
Apply	15
Analyze	15
Evaluate	10
Create	

New Horizon College of Engineering

MECHANICAL MEASUREMENTS AND METROLOGY LAB

Course Code	21MEL37A
L: T: P: S	0:0:1:0
Exams Hours	03

Credits	01
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEL37A.1	Calibrate the measuring instruments such as micrometer, pressure gauge, LVDT, load cell, thermocouple, strain gauge etc
21MEL37A.2	Determine the taper angle, surface roughness and alignment of machined components
21MEL37A.3	Measure the screw thread and gear tooth parameters of the specimens
21MEL37A.4	Compute the cutting forces and torque in drilling and turning using dynamometers

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21MEL37A.1	3								3				3	
21MEL37A.2	3								3					3
21MEL37A.3	3	2							3					3
21MEL37A.4	3	2							3				3	3

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) R.K. Jain, 'Engineering Metrology', Khanna Publishers, 2022, Edition 22, ISBN-13: 978-8174091536.
- 2) Beckwith Marangoni and Lienhard, 'Mechanical Measurements', Pearson Education, 7th Edition, 2015, ISBN 13: 978-8131717189.
- 3) Dr. T Chandrashekar, 'Metrology and Measurement', Subhas publication, 2017, ISBN: 9789383214198.

REFERENCE BOOKS:

- 1) I.C. Gupta, 'Engineering Metrology', Dhanpat Rai Publications, Delhi, 8th Edition, 2018, ISBN 13: 9788189928452.
- 2) R.K. Jain, 'Mechanical and Industrial Measurements', Khanna Publishers, 2008, ISBN: 9788174091918.
- 3) Anand K. Bewoor & Vinay A. Kulkarni, 'Metrology & Measurement', Tata McGraw Hill Pvt. Ltd., New Delhi, 2009, ISBN: 9781259081323.
- 4) N V Raghavendra and Krishnamurthy, 'Engineering Metrology and Measurement', Oxford University Press, 2013, ISBN: 9780198085492.

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Syllabus

Exp. No.	Contents of Experiment	Hrs	COs
1	Calibration of load cell using standard weights	2	21MEL37A.1
2	Calibration of micrometer using slip gauge	2	21MEL37A.1
3	Calibration of LVDT using micrometer	2	21MEL37A.1
4	Calibration of pressure gauge	2	21MEL37A.1
5	Measurement of Taper angle using sine bar and slip gauge	2	21MEL37A.2
6	Measurement of surface roughness of a component using mechanical comparator	2	21MEL37A.2
7	Measurement of screw thread parameters using Tool makers' microscope	2	21MEL37A.3
8	Measurement of a screw thread parameters using floating carriage micrometer by 2-wire method	2	21MEL37A.3
9	Measurement of gear parameters using gear tooth vernier	2	21MEL37A.3
10	Measurement of alignment of surface plate using roller set	2	21MEL37A.2
11	Comparison and measurement of temperature using thermocouple and RTD	2	21MEL37A.1
12	Measurement of cutting forces and torque using lathe/ drill tool Dynamometer	2	21MEL37A.4
13	Determination of young's modulus using strain gauge.	2	21MEL37A.1

Assessment Pattern

CIE (50 Marks – Lab)

Bloom's Category	Experiments / Tests	Record	Viva
Marks	20	20	10
Remember			2
Understand			2
Apply	10	10	4
Analyze	10	10	2
Evaluate			
Create			

SEE (50 Marks – Lab)

Bloom's Category	Test
Remember	
Understand	
Apply	20
Analyze	20
Evaluate	10
Create	

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FOURTH SEMESTER SYLLABUS

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ENGINEERING THERMODYNAMICS

Course Code	21MEE45A
L: T: P:S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE45A.1	Understand the basic concepts of thermodynamics like systems, equilibrium, process etc and its applications
21MEE45A.2	Identify the different types of work and heat transfer mechanisms.
21MEE45A.3	Apply the laws of thermodynamics to real system.
21MEE45A.4	Differentiate reversible and irreversible process using second law and entropy concepts
21MEE45A.5	Apply the theoretical knowledge of internal combustion engines to determine the performance characteristics and draw heat balance sheet of petrol and diesel engines.
21MEE45A.6	Evaluate the performance of air standard cycles, vapor power cycles and Refrigeration cycles

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2
21MEE45A.1	3													
21MEE45A.2	3	3												3
21MEE45A.3		3	3											3
21MEE45A.4	3													3
21MEE45A.5	3	3	3	1										3
21MEE45A.6	3	3												3

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) Engineering Thermodynamics, P.K.Nag, Tata McGraw Hill Publication, 6th edition, 2017, ISBN: 9789352606429.
- 2) Engineering Thermodynamics, R.K Rajput, Lakshmi Publications, 2019, ISBN 9788131800584.

REFERENCE BOOKS:

- 1) Fundamentals of Engineering Thermodynamics, Moran J Shapiro., John wiley 8th edition, 2015, ISBN – 9780470032091.
- 2) Thermodynamics, An Engineering Approach, YunusA.Cenegal and Michael A.Boles, Tata McGraw Hill publications,9th edition 2019, ISBN - 9953165741
- 3) Fundamentals of Thermodynamics, Claus Borgnakke, Richard Edwin Sonntag,wiley india edition, 2020,WILEY, ISBN – 9788126598199

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Syllabus

Module No	Module Contents	Hrs	COs
1	Fundamental Concepts & Definitions: Thermodynamics: definition cyclic and non-cyclic processes Thermodynamic equilibrium: definition and conditions, Zeroth law of thermodynamics: Statement, and significance. Temperature concepts: two point scales and one-point scale, Numerical on temperature scales	8	21MEE45A.1 21MEE45A .3
2	Work and Heat: Mechanics definition of work and its limitations. Thermodynamic definition of work; examples, sign convention. Displacement work explanation, expressions for displacement work in various processes through p-V diagrams, Problems on work transfer and heat transfer. First Law of Thermodynamics: Joules experiment, Statement of the First law of thermodynamics, steady state-steady flow energy equation, Assumptions for SFEE and some important applications. Numerical on open and closed systems	8	21MEE45A.2 21MEE45A .3
3	Second Law of Thermodynamics: Thermal reservoirs. Direct heat engine; schematic representation and efficiency. Reversed heat engine, schematic representation, coefficients of performance. Kelvin - Planck and Clausius statement of the Second law of Thermodynamics; Equivalence of the two statements, Numericals Entropy: Clausius theorem, Clausius inequality; Statement, proof, application to a reversible cycle. Entropy; definition, a property, change of entropy for irreversible process, principle of increase in entropy of the universe, Numerical	8	21MEE45A .3 21MEE45A .4
4	RECIPROCATING INTERNAL COMBUSTION ENGINES: Concepts of Four-stroke & Two -stroke Engine and valve timing diagram, Measurement of air and fuel flow rates, Engine output and efficiency, Engine performance characteristics, problems on Morse test and Heat Balance Sheet	8	21MEE45A .5
5	Heat Power Cycles: Carnot, Otto, Diesel, Dual, Rankine, Brayton cycles (Derivation on efficiencies of the cycles and Numericals) Refrigeration cycles and Air Conditioning: Reversed Carnot, Bell Coleman cycle, Vapour compression cycles (Expression for COP of the cycles and Numericals). Summer and winter air conditioning.	8	21MEE45A .6

Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Quizzes
Marks	25	15	10
Remember	5		
Understand	5	5	5
Apply	5	5	5
Analyze	5	5	
Evaluate	5		
Create			

SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
Remember	10
Understand	20
Apply	10
Analyze	5
Evaluate	5
Create	2

New Horizon College of Engineering

Engineering Thermodynamics LAB

Course Code	21MEL45A
L: T: P:S	0:0:1:0
Exams Hours	03

Credits	01
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEL45A.1	Conduct tests to determine the properties of fuels and oils
21MEL45A.2	Investigate performance tests on IC engines and draw characteristics plots
21MEL45A.3	Analyze the area of irregular and regular surfaces using planimeter
21MEL45A.4	Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21MEL45A.1	3	3											3	
21MEL45A.2	3	3	3	3			3						3	
21MEL45A.3	3	3											3	
21MEL45A.4	3	3	3	3			3						3	

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 1) Engineering Thermodynamics, P.K.Nag, Tata McGraw Hill Publication, 6th edition, 2017, ISBN: 9789352606429.
- 2) Engineering Thermodynamics, R.K Rajput, Lakshmi Publications , 2019, ISBN 9788131800584.

REFERENCE BOOKS:

- 1) Fundamentals of Engineering Thermodynamics, Moran J Shapiro, John wiley 8th edition, 2015, ISBN – 9780470032091.
- 2) Thermodynamics, An Engineering Approach, YunusA.Cenegal and Michael A.Boles, Tata McGraw Hill publications,9th edition 2019, ISBN - 9953165741
- 3) Fundamentals of Thermodynamics, Claus Borgnakke, Richard Edwin Sonntag,wiley india edition, 2020,WILEY, ISBN – 9788126598199

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Syllabus

Exp. No.	Contents of Experiment	Hrs	COs
1	Valve Timing diagram of a 4 stroke I.C. engine	2	21MEL45A.2
2	Port opening Timing diagram of a 2 stroke I.C. engine	2	21MEL45A.2
3	Performance Tests on I.C. Engines (multi cylinder diesel), Calculations of IP, BP, Thermal efficiencies, Volumetric efficiency, Mechanical efficiency, SFC, FP, A:F Ratio.	2	21MEL45A.2
4	Heat balance sheet and Morse test for Four Stroke Diesel Engine.	2	21MEL45A.2
5	flash point and fire point using open cup apparatus	2	21MEL45A.1
6	flash point and fire point using closed cup apparatus	2	21MEL45A.1
7	Determination of area of irregular surface using Planimeter,	2	21MEL45A.3
8	Performance Tests on I.C. Engines, (single cylinder diesel), Calculations of IP, BP, Thermal efficiencies, Volumetric efficiency, Mechanical efficiency, SFC, FP, A:F Ratio for Four stroke Diesel Engine	2	21MEL45A.2
9	Determination of Calorific value of solid and liquid fuels	2	21MEL45A.1
10	Determination of Calorific value of gaseous fuels	2	21MEL45A.1
11	Performance Test on a Vapour Compression Refrigeration	2	21MEL45A.4
12	Performance Test on a Vapour Compression Air – Conditioner	2	21MEL45A.4

Assessment Pattern

CIE (50 Marks – Lab)

Bloom's Category	Experiments / Tests	Record	Viva
Marks	20	20	10
Remember			2
Understand		5	2
Apply		5	2
Analyze	10	5	2
Evaluate	10	5	2
Create			

SEE (50 Marks – Lab)

Bloom's Category	Test
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	

New Horizon College of Engineering

MECHANICS OF MATERIALS

Course Code	21MEE46A
L: T: P:S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE46A.1	Understand and calculate the simple stresses and strains induced in various bars of different cross sections, and the mechanical properties of materials in the design of structural members.
21MEE46A.2	Identify the behavior of beams under various lateral loads, by determining the shear force and bending moments, and the shear force diagrams and bending moment diagrams.
21MEE46A.3	Analyze the effects of bending and shear loads on structural members.
21MEE46A.4	Develop a working knowledge of the analytical methodologies used in column structural design.
21MEE46A.5	Design circular shafts subjected to torsional loads and, compute the stresses and strains in thick and thin cylindrical pressure vessel
21MEE46A.6	Apply structural mechanics of deformable bodies to solve engineering problem.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
21MEE46A.1	3	3	3	3										3
21MEE46A.2	3	3	3	3										3
21MEE46A.3	3	3	3	3										3
21MEE46A.4	3	3	3	3										3
21MEE46A.5	3	3	3	3										3
21MEE46A.6	3	3	3	3										3

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

TEXT BOOKS:

- 2) Ferdinand Beer & Russell Johnston., 'Mechanics of Materials', McGraw Hill India, 7th Edition, 2016, ISBN- (13 digits): 9789339217624.
- 3) Ramamrutham S., 'Strength of Materials', Dhanpat Rai Publishing Co Pvt Ltd, 6th Edition, 2017, ISBN- (13 digits): 978-9352164387; ISBN-(10 digits): 9352164385

REFERENCE BOOKS:

- 5) R C Hibbeler., 'Mechanics of Materials', Pearson Education, 9th Edition, 2018, ISBN-(13 digits): 978-9332584037; ISBN-(10 digits): 9332584036.
- 6) James M. Gere, Barry J. Goodno., 'Mechanics of Materials', Cengage Learning, 8th Edition, 2014, ISBN- (13 digits): 9788131524749.
- 7) S S Rattan., 'Strength of Materials', McGraw Hill India, 2nd Edition, 2011, ISBN-(13 digits): 978-0071072564; ISBN-(10 digits): 007107256X

New Horizon College of Engineering

Syllabus

Module No	Module Contents	Hrs	COs
1	Simple Stress and Strain: Assumptions in MOM, stress, strain, mechanical properties of materials, Linear elasticity, Hooke's Law and Poisson's ratio, Stress-Strain curve for Mild steel, cast iron and Aluminum. Extension /Shortening of a bar, bars with cross section varying in steps, bars with continuously varying cross sections (circular and rectangular), Elongation due to self-weight, Principle of super position, Thermal Stresses (No Numerical's), elastic constants(only definition). Definition of Indeterminate structures (No Numerical's).	8	21MEE46A.1, 21MEE46A.6
2	Bending Moment and Shear Force Diagrams: Introduction, Types of beams, loads and reactions, shear forces and bending moments, Rate of loading, sign conventions, relationship between shear force and bending moments. Shear force and bending moment diagrams for different beams subjected to concentrated loads, uniformly distributed load, (UDL) uniformly varying load (UVL) and couple for different types of beams.	8	21MEE46A.2, 21MEE46A.6
3	Bending and Shear Stresses in Beams: Introduction, Theory of simple bending, assumptions in simple bending. Bending stress equation, relationship between bending stress and radius of curvature, relationship between bending moment and radius of curvature. Moment carrying capacity of a section. Shearing stresses in beams, shear stress across rectangular, circular, symmetrical I and T sections.	8	21MEE46A.3, 21MEE46A.6
4	Deflection of Beams: Introduction, Differential equation for deflection. Equations for deflection, slope and bending moment. Double integration method for cantilever and simply supported beams for point load, UDL, UVL and Couple, Macaulay's method. Elastic Stability of Columns: Introduction, Columns and struts, slenderness ratio, Classification of columns, buckling load or critical load, Sign conventions, Euler's theory of buckling, Effective length for various boundary conditions, Limitations of Euler's theory, Rankine formula, numerical.	8	21MEE46A.3, 21MEE46A.4, 21MEE46A.6
5	Torsion of Circular Shafts: Introduction, Pure torsion, assumptions, derivation of torsional equations, polar modulus, Torsional rigidity / stiffness of shafts. Power transmitted by solid and hollow circular shafts Thick and Thin Cylinder: Stresses in thin cylinders, changes in dimensions of cylinder (diameter, length and volume). Thick cylinders - Lamé's equation, Problems on Lamé's equation.	8	21MEE46A.5, 21MEE46A.6

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Assessment Pattern

CIE (50 Marks – Theory)

Bloom's Category	Tests	Assignments	Quizzes
Marks	25	15	10
Remember	4		
Understand	4		
Apply	6	3	5
Analyze	8	7	5
Evaluate	3	5	
Create			

SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
Remember	8
Understand	7
Apply	15
Analyze	15
Evaluate	5
Create	

New Horizon College of Engineering

MATERIAL SCIENCE AND METALLURGY

Course Code	21MEE47A
L: T: P: S	2:1:0:0
Exams Hours	03

Credits	03
CIE Marks	50
SEE Marks	50

Course Outcomes: At the end of the Course, the student will be able to:

21MEE47A.1	Identify the properties of metals with respect to crystal structure and grain size.
21MEE47A.2	Explain the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy. Construction and identification of phase diagrams and reactions
21MEE47A.3	Understand invariant reactions and various Equilibrium diagrams. Introduce the concept of hardenability & demonstrate the test used to find hardenability of steels.
21MEE47A.4	Recommend the suitable type of Heat treatment which helps in various applications and Significance of properties Vs microstructure.
21MEE47A.5	Classify and Distinguish different types of cast irons, steels and non ferrous alloy for specific applications
21MEE47A.6	Understand the concept of powder metallurgy and its applications, Manufacturing of Ceramics and its types.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
21MEE47A.1	3	3	3	-	-	-	3	-	-	-	-	3	3	
21MEE47A.2	3	3	3	-	-	-	3	-	-	-	-	3	3	
21MEE47A.3	3	3	3	-	-	-	3	-	-	-	-	3	3	
21MEE47A.4	3	3	3	-	-	-	3	-	-	-	-	3	3	
21MEE47A.5	3	3	3	-	-	-	3	-	-	-	-	3	3	
21MEE47A.6	3	3	3	-	-	-	3	-	-	-	-	3	3	

Ratings: 3 for high, 2 for substantial, 1 for low. To be followed in mapping.

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TEXT BOOKS:

1. "Introduction to Physical Metallurgy" Sidney H Avner, Mcgraw Hill Education, 1997, ISBN 13: 9780074630068.
2. "Fundamentals of Material Science and Engineering" David G Rethwisch William D Callister Jr. Rethwisch Callister, John Wiley & Sons Publishers, 4th Edition, 2012, ISBN13: 978111806160

REFERENCES:

1. "Materials Science and Engineering", V. RAGHAVAN, PHI Learning, 2004, ISBN: 9788120324558
2. "Engineering Materials", Kenneth G. Budinski, Michael K. Budinski, Prentice Hall, 9 editions, 2010, ISBN: 9780137128426

Syllabus

Module No	Module Contents	Hrs	COs
1	Crystal Structure: BCC, FCC and HCP Structures, coordination number and atomic packing factors, Derivation of APF for BCC, FCC & HCP structures, crystal imperfections -point line and surface imperfections. Simple problems. Atomic Diffusion: Phenomenon, Ficks laws of diffusion, factors affecting diffusion. Simple problems.	8	21MEE47A.1
2	Phase Diagram I: Solid solutions, Hume Rothary rule, substitutional, and interstitial solid solutions, intermediate phases, Gibbs phase rule. Phase Diagram II: Construction of equilibrium diagrams involving complete and partial solubility, lever rule. Different types invariant reactions – Eutectic, Eutectoid, Peritectic, Peritectectoid reactions	8	21MEE47A.2
3	Iron carbon equilibrium diagram: Description of phases, solidification of steels and cast irons, invariant reactions. Heat treating of metals TTT curves, continuous cooling curves, description of the following heat treatment processes with industrial applications: annealing and its types. normalizing, hardening, tempering, martempering, austempering, hardenability, surface hardening methods like carburizing, cyaniding, nitriding, Flame hardening, induction hardening.	8	21MEE47A.3 21MEE47A.4
4	Engineering materials: Properties, Composition and Applications of Grey cast iron, White cast Iron, malleable iron, SG iron and steels, Copper & Aluminium alloys. Titanium and Magnesium alloys.	8	21MEE47A.5
5	Ceramics: Introduction to ceramics, nature of ceramics, types of ceramics, properties of ceramics materials, ceramic forming techniques, applications of ceramics. Powder Metallurgy: Definition and concept, applications, powder metallurgy process, Production of metal powders, characteristics of metal powders, compacting, pre sintering and sintering.	8	21MEE47A.6

New Horizon College of Engineering

Assessment Pattern

CIE (50 Marks – Theory)

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SEE (50 Marks – Theory)

Bloom's Category	Tests (theory)
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Understand	7
Apply	15
Analyze	15
Evaluate	5
Create	