GOVERNMENT POLYTECHNIC PAONTA SAHIB

AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031
DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG- DEC 2025
Semester	5th
Course Code	MEPC301
Course Name	FLUID MECHANICS AND HYDRAULIC MACHINERY
Course Type	PROGRAMME CORE
Class	MECHANICAL ENGINEERING
L-P-DCS	2-0-2
Name of Faculty	NITISH SHARMA
Semester Start & End Dates	04-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Hours/Weeks			Total hours/ week	Credits	Internal Assessment			External Assessment					Total
		L	P	DCS			Th.	Pr.	Total	Th.	Hrs.	Pr.	Hrs.	Total	
1	BASIC MECHANICAL ENGINEERING	2	0	2	4	2	40	...	40	60	3	....	....	60	100

Date	Topic Details	Delivery Method
Unit-1 (i) Properties of fluid		Chalk Blackboard and using Digital Media
Day 1	Density, Specific Gravity, Specific Weight, Specific Volume	
Day 2	Dynamic Viscosity and Kinematic Viscosity	
Day 3	Surface Tension and Capillarity	
Day 4	Vapour Pressure and compressibility	
Unit-1 (ii) Fluid pressure and Pressure Measurement		
Day 5	Fluid Pressure, Pressure Head and Pressure Intensity	
Day 6	Concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure	
Day 7	Simple manometer and Bourdan Pressure gauge	
Day 8	Differential Manometer	
Day 9-10	Numerical Problems	
Unit-2 (i) Fluid Flow		
Day 11	Types of fluid flow	
Day 12	Path Line and Stream Line, Continuity Equation	
Day 13	Bernoulli's theorem for ideal fluid	

Day 14	Principle of operation of Venturimeter (derivation of discharge)	Chalk Blackboard and using Digital Media
Day 15	Orificemeter (derivation of discharge)	
Day 16	Pitot Tube (derivation of discharge)	
Day 17-18	Numerical Problems	
Unit-2 (ii) Flow Through Pipes		
Day 19	Laminar and Turbulent Flows	
Day 20	Darcy's and Chezy's equation for frictional losses	
Day 21	Minor Losses in pipes	
Day 22	Hydraulic and total gradient line	
Day 23-24	Numerical Problems	
Unit-3 Impact of Jets		
Day 25	Impact of Jet on fixed and moving vertical flat plates	
Day 26	Impact of jet on curved vanes	
Day 27-28	Numerical Problems	
Unit-4 Hydraulic Turbines		
Day 29	Layout of Hydroelectric power plant	
Day 30	Features of Hydroelectric power plant	
Day 31	Classification of Hydraulic Turbines	
Day 32	Selection of Turbines on the basis of Head and discharge available	
Day 33	Construction and working principle of Pelton Wheel Turbine	
Day 34	Construction and working principle of Francis Turbine	
Day 35	Construction and working principle of Kaplan Turbine	
Day 36	Draft tubes- Types and construction	
Day 37	Cavitation in turbine	
Day 38	Calculation of Work Done, Power of Turbine	
Day 39	Calculation of efficiency of Turbine, Unit Quantities	
Day 40-41	Numerical Problems	
Unit-5 (i) Centrifugal Pumps		
Day 42	Principle of working and application of centrifugal pump	
Day 43	Types of casing and impellers	
Day 44	Concept of Multistage centrifugal pump	
Day 45	Priming and cavitation in centrifugal pump	
Day 46	Manometric Head, Work Done, Manometric Efficiency, Overall Efficiency of centrifugal pump	
Unit-5 (ii) Reciprocating Pumps		
Day 47	Construction of single acting reciprocating pump	
Day 48	Working and applications of single acting reciprocating pump	
Day 49	Construction of double acting reciprocating pump	
Day 50	Working and applications of double acting reciprocating pump	
Day 51	Concept of Slip and negative slip	
Day 52- 53	Concept of cavitation and separation	
Day 54 -56	Revision	

	Name of Book	Author Name	Publication
Prescribed Books	1. Fluid Mechanics and Hydraulic Machines	R.K Bansal	Laxmi Publications
	2. Hydraulics and Fluid Mechanics	P.N Modi and S.M Seth	Standard Book House
	3. Hydraulic, Fluid Mechanics and Fluid Machines	S Ramamrutham	Dhanpath Rai and Sons

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DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	FIFTH
Course Code	MEPC303
Course Name	ADVANCED MANUFACTURING PROCESSES
Course Type	PROGRAMME CORE COURSE (PC)
L-T-P	2-2-0
Name of Faculty	SANJEEV KUMAR SHARMA
Semester Start & End Dates	1-08-2025 TO 30-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Th	DCS	Pr	Internal Assessment			External Assessment					Total Marks
					Th.	Pr.	Total	Th.	Hrs.	Pr.	Hrs.	Total	
1	ADVANCED MANUFACTURING PROCESSES	2	2	0	40	0	40	60	3	0	3	100	100

Hours	Unit & Topic of Discussion	Topic Details	Delivery Method
	Unit1: Jigs & Fixtures		Chalk & Blackboard And Projector
1Hr	Definition of jig		
1Hr	Types of jigs: Leaf jig, Box and Handle jig		
1Hr	Template jig, Plate jig, Indexing jig		
1Hr	Universal jig, Vice jigs		
1Hr	General consideration in the design of drill jigs		
1Hr	General consideration in the design of Drill bush		
1Hr	Types of fixtures: Vice fixtures, Milling fixtures,		Chalk & Blackboard And Projector
1Hr	Boring fixtures		
1Hr	Grinding fixtures		
1Hr	Basic principles of location		
1Hr	Locating methods and devices		
1Hr	Basic principles of the clamping:		
1Hr	Types of clamps: Strap clamps, Cam clamps		
1Hr	Screw clamps, Toggle clamps, Hydraulic and Pneumatic clamps.		
	Unit-II:Plastic Processing		Chalk & Blackboard
1Hr	Processing of plastics		
1Hr	Moulding processes		

		And Projector
1Hr	Injection moulding	
1Hr	Compression moulding.	
1Hr	Transfer moulding	Chalk & Blackboard And Projector
1Hr	Extruding: casting	
1Hr	Fabrication methods-sheet forming	
1Hr	Blow moulding	
1Hr	Laminating plastics(sheets, rods & tubes)	
1Hr	Reinforcing: applications of plastics	
	UNIT-III **Modern Machining Processes**	
1Hr	Principle	Chalk & Blackboard And Projector
1Hr	Description of Ultrasonic Machining	
1Hr	Applications of Ultrasonic Machining	
1Hr	Electric Discharge Machining	
1Hr	Electric Discharge Machining	
1Hr	Wire cut EDM	
1Hr	Abrasive Jet Machining	
1Hr	Laser Beam Machining	
1Hr	Electro Chemical Machining.	
	Unit-IV: CNC Milling Machines Vertical and horizontal machining center	
1Hr	Vertical and horizontal machining center	
1Hr	Constructional features	
1Hr	Constructional features	
1Hr	Axis identification.	
1Hr	Electronic control system	
1Hr	Automatic tool changer	
1Hr	tool magazine	
1Hr	CNC programming: Preparatory functions (G code)	
1Hr	miscellaneous functions (M code)	
1Hr	Part programming	
1Hr	Part programming	
	Unit-IV :Special Purpose Machines (SPM)	
1Hr	Concept of Special Purpose Machines (SPM)	
1Hr	General elements of SPM	
1Hr	Productivity improvement by SPM	
1Hr	Principles of SPM design	
1Hr	**Maintenance of Machine Tools**	Chalk & Blackboard And Projector
1Hr	Types of maintenance	
1Hr	Repair cycle analysis	
1Hr	Repair complexity	
1Hr	Maintenance manual	
1Hr	Maintenance records	
1Hr	Housekeeping	
1Hr	Introduction to Total Productive Maintenance(TPM)	

	Name of Book	Author Name	Publication
Prescribed Books	CNC machines	Pabla B.S. & M. Adithan,	New Age international limited
	Manufacturing Processes	Begman & Amsted	John Willey and Sons.
	Advanced manufacturing technology	David L. Goetsch	

Signature of Subject Incharge

Sanjeev Kumar Sharma

Signature of Head of Department

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AT DHAULA KUAN, DISTT. SIRMOUR (HP) - 173031
DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG 2025-DEC 2025
Semester	FIFTH
Course Code	MEPE 301-2
Course Name	ELEMENTS OF REFRIGERATION AND AIR CONDITIONING
Course Type	PROGRAMME ELECTIVE (PE)
L-D-C-S-P	3-1-0
Name of Faculty	MUNEESH KUMAR
Semester Start & End Dates	04-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

Sr. No.	Name of the Subject	Th.	Pr.	Internal Assessment			External Assessment					Total Marks
				Th.	Pr.	Total	Th.	Hrs.	Pr.	Hrs.	Total	
1	REFRIGERATION AND AIR CONDITIONING	4	0	40	–	40	60	3	–	–	60	100

Hours	Lectures	Unit & Topic of Discussion	Delivery Method
		Unit-1 : Introduction to Refrigeration	Chalk & Blackboard And Projector
8 hours	L1,L2	Basic of thermodynamics and heat transfer, Definition of Refrigeration	
	L3	Refrigerating effect-unit of refrigerationCoefficient of performance	
	L4	Carnot refrigeration Cycle	
	L5	Air refrigeration-Bell-Coleman cycle ,PV & TS diagram; Advantage and disadvantages in air refrigeration	
	L6,L7,L8	Simple problems on Carnot refrigeration cycle	
		Unit-2 : Refrigeration systems	
10 hours	L9,L10	Basic Components, Flow diagram of working of Vapour compressioncycle;Representation ofthe vapour compression cycle onP-H & T-SDiagram	
	L11,L12	Expression for Refrigerating effect, work done and power required	
	L13	Types of Vapour Compression cycle	
	L14,L15	Effects of superheating and sub cooling, its advantages and disadvantages	
	L16,L17	Simple Vapour absorptions cycle and its flow diagram	
	L18	Comparison of Vapour absorption and vapour compression system	
		Unit-3 : A) Refrigeration equipments	
12 hours	L19	Compressor - Hermetically sealed and Semi hermetically sealed compressor	
	L20,L21	Condensers - Air Cooled, water cooled, natural and forced draught cooling system	
	L22	Advantages and disadvantages of air cooled and water cooled condensers	
	L23,L24	Evaporators- natural convection, forced convection types	

		B) Refrigerants and lubricants
	L25,L26	Introduction to refrigerants
	L27	Properties of good refrigerants
	L28	Classification of refrigerants
	L29	Detection of refrigerants leakage; Charging the system with refrigerant
	L30	Lubricants used in refrigeration and their properties
		Unit-4 : A) Refrigerant flow controls
11 Hours	L31,L32	Capillary tube; Automatic Expansion valve
	L33	Thermo static expansion valve
	L34,L35	High side and low side float valve
	L36,L37	Solenoid valve; Evaporator pressure regulator
		B) Application of refrigeration
	L38,L39	Slow and quick freezing
	L40	Cold storage and Frozen storage
	L41,L42	Dairy refrigeration; Ice making industry
	L43	Water coolers
		Unit 5: A) Air conditioning
13 Hours	L44,L45	Introduction to Air conditioning
	L46	Factors affecting Air conditioning
	L47	Brief description of Dry Bulb Temperature, Wet bulb Temperature, Dew point temperature
	L48,L49	Psychometric chart and its use
	L50,L51	Psychometric process-sensible heating and cooling, Humidification and chumidification; cooling and dehumidification, heating and humidification
	L52,L53,L54	Simple problems on above psychrometric processes only by using psychrometric chart
		B) Refrigeration and Air-conditioning tools
	L55	Tools used in refrigeration and Air conditioner installation
	L56	Installation procedure; Servicing procedure

	Name of Book	Author Name	Publication
Prescribed Books	1. Refrigeration & air conditioning.	Sadhu Singh	Khanna Book Publishing Co.,New Delhi
	2. Refrigeration and Air Conditioning	C.P Arora	Tata Mc Graw Hills
	3. Refrigeration and Air Conditioning.	R.S Khurmi	S Chand and Company
	4. Refrigeration & Air condition.	S. Domakundawar	Dhanpat Rai publications

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

CO1	**Define refrigeration and types of Refrigeration cycles**
CO2	**Explain Vapour Compression and Vapour Absorbtion System working principles**
CO3	**Identify the components required for refrigeration system.**
CO4	**Identify the controlling components for a refrigeration system**
CO5	**Explain the working principles of Air-conditioning.**

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DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	FIFTH
Course Code	MEOW 301
Course Name	Renewable Energy Technologies
Course Type	PROGRAMME CORE
L-T-P	3-1-0
Name of Faculty	MR. X
Semester Start & End Dates	04-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

S.No	Name of the Subject	Th	DCS	Pr	Internal Assessment Th	Pr	Total	External Assessment Th	Hrs	Pr	Hrs	Total	Total Marks
1.	THEORY OF MACHINES & MECHANISMS	3	2	0	40	0	40	60	3	0	0	60	100

Course Learning Objectives:

- To understand the present and future scenario of world energy use.
- To understand the fundamentals of solar energy systems.
- To understand the basics of wind energy.
- To understand bio energy and its usage in different ways.
- To identify different available non-conventional energy sources

HOURS	Unit & Topic of Discussion	Topic Details	Delivery Method
10 HOURS	Introduction	World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials; Achievements/Applications; Economics of renewable energy systems.	
10 HOURS	Solar energy	Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation; Fundamentals of Solar PhotoVoltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.	

10 HOURS	Wind Energy	Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.	CHALK-B LACKBO ARD & USING TECHNO LOGICAL PEDAGO GY
13 HOURS	Bio-Energy	Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Biodiesel; Cogeneration; Biomass Applications.	
13 HOURS	Other Renewable Energy Sources:	Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.	

	Name of Book	Author Name	Publication
Prescribed Books	Energy Technology	O.P. Gupta	Khanna Publishing House, Delhi (ed. 2018)
	Renewable Energy Sources,	Twidell, J.W. & Weir, A	EFN Spon Ltd., UK, 2006

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

CO1 Understand present and future energy scenario of the world.
CO2 Understand various methods of solar energy harvesting.
CO3 Identify various wind energy systems.
CO4 Evaluate appropriate methods for Bio-energy generations from various Bio-wastes.
CO5 Identify suitable energy sources for allocation.

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DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Academic Year	AUG - DEC 2025
Semester	FIFTH
Course Code	MEPC305
Course Name	THEORY OF MACHINES & MECHANISMS
Course Type	PROGRAMME CORE
L-T-P	3-2-0
Name of Faculty	MR. X
Semester Start & End Dates	04-08-2025 TO 26-11-2025

STUDY AND EVALUATION SCHEME

S.No	Name of the Subject	Th	DCS	Pr	Internal Assessment			External Assessment					Total Marks
					Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
1.	THEORY OF MACHINES & MECHANISMS	3	2	0	40	0	40	60	3	0	0	60	100

Course Objectives:

- To understand different types of cams and their motions and also to draw cam profiles for vari-ous motions.
- To understand the mechanism of various types of drives available for transmission of power.
- To understand the design of Brakes, Dynamometers, Bearings and Clutchesand their function and working.
- To understand the need for balancing of masses in the same plane To know different types of governors.

HOURS	Unit & Topic of Discussion	Topic Details	Delivery Method
14 HOURS	Cams and Followers	Concept; Definition and application of Cams and Followers; Classification of Cams and Followers; Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation; Drawing of profile of radial cam with knife-edge and roller follower without offset for reciprocating motion (graphical method for uniform velocity and SHM only).	
17 HOURS	Power Transmission	Types of Drives: Belt Drives - flat belt, V– belt & its applications; Material for flat and V-belt; Angle of lap, Belt length. Slip and Creep; Determination of Velocity Ratio, Ratio of tight side and slack side tension; Centrifugal tension and Initial tension; Condition for maximum power transmission (Formula without proof) (Simple numerical); Chain Drives–Advantages & Disadvantages;; Gear Drives	

		Spur gear terminology; Types of gears and gear trains. Tram value & Velocity ratio for simple and compound gear train.	
17 HOURS	Flywheel and Governors	Flywheel – Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine; Co-efficient of fluctuation of energy, Coefficient of fluctuation of speed and its significance; Governors-Types and explanation with neat sketches (Centrifugal, Watt and Porter); Concept, function & Terminology of Governors; Comparison between Flywheel and Governor.	
18 HOURS	Brakes, Clutches & Bearings	Function of brakes; Types of brakes; Comparison between brakes and dynamometers; Construction and working of i) shoe brake, ii) Band Brake, iii) Disc Brake; Concept of Self Locking & Self energizing brakes; Clutches- Function of Clutch and its application; Construction and working of i)Single plate clutch, ii) Multi plate clutch, iii) Centrifugal Clutch and iv) Cone clutch; Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot.	CHALK-BLACKBOARD & USING TECHNOLOGICAL PEDAGOGY
14 HOURS	Balancing & Vibrations	Concept of balancing; Balancing of single rotating mass; Graphical method for balancing of several masses revolving in same plane; Vibrations, its type and concept of damping :Causes of vibrations in machines; their harmful effects and remedies.	

	Name of Book	Author Name	Publication
Prescribed Books	Theory of machines	S.S.Rattan	Tata McGraw-Hill publications.
	Theory of machines	R.S. Khurmi & J.K.Gupta	S.Chand publications

Course outcomes:

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

CO1: Know different machine elements and mechanisms.

CO2 Understand Kinematics and Dynamics of different machines and mechanisms.

CO3 Select Suitable Drives and Mechanisms for a particular application.

CO4 Appreciates the concept of balancing and Vibration.

CO5 Develops the ability to come up with innovative ideas.

CO6 Understand different types of cams and their motions and also draw cam profiles for various motions

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