UCPES,BERHAMPUR

Session (2025-2026)

LESSON PLAN

Discipline : Mechanical Engg.	**Semester: 5th, Winter/2025**	**Name of the Faculty: Mr. HADU BANDHU DAKUA, LECTURER STAGE-I(MECH)**
Subject: Entrepreneurship & Management & Smart Technology, Theory-1	No. of Days/Week: 04	**Start Date** : 11/07/2025 **End Date** : 15/11/2025
Week	**Class Day**	**Theory Topics**
1st	1st	Concept /Meaning of entrepreneurship and Need of Entrepreneurship
	2nd	Characteristics, Qualities and Types of entrepreneur
	3rd	Functions and Barriers in entrepreneurship
	4th	Entrepreneurs vs Manager Forms of Business Ownership: Sole proprietorship
2nd	1st	Partnership forms, Cooperative society business
	2nd	joint Hindu family business , joint stock company
	3rd	types of Industries, Concept of Start-ups
	4th	Entrepreneurial support agencies at National, State, DistrictLevel(Sources): DIC, NSIC,OSIC, SIDBI
3rd	1st	NABARD, Commercial Banks, KVIC etc.
	2nd	Technology Business Incubators (TBI) and Science andTechnology Entrepreneur Parks
	3rd	**Doubt clearing class & Practice**
	4th	Business Planning, SSI, Ancillary Units, Tiny Units, Service Sector Units
4th	1st	Time schedule Plan, Agencies to be contacted for ProjectImplementation
	2nd	Assessment of Demand and supply, Potential areas of Growth
	3rd	Identifying Business Opportunity
	4th	Final Product selection
5th	1st	Preliminary project report
	2nd	Detailed project report
	3rd	Techno economic Feasibility, Project Viability
	4th	**Doubt clearing class and practice**

6th	1st	Definitions of management ,Principles of management
	2nd	Functions of management : planning
	3rd	organizing , Staffing
	4th	directing and controlling
7th	1st	Level of Management in an Organization
	2nd	**Quiz test**
	3rd	Production management :Functions, Activities andProductivity, Quality control
	4th	Production Planning and control, Inventory Management
8th	1st	Need for Inventory management .Models/Techniques of Inventory management
	2nd	Financial Management :Functions of Financial management,management of Working capital
	3rd	Costing (only concept),Break even Analysis,
	4th	Brief idea about Accounting Terminologies: Book Keeping,Journal entry, Petty Cash book
9th	1st	P&L Accounts, Balance Sheets(only Concepts)
	2nd	Marketing Management : Concept of Marketing and MarketingManagement
	3rd	Marketing Techniques (only concepts) Concept of 4P s (Price,Place, Product, Promotion)
	4th	Human Resource Management : Functions of Personnel Management, Manpower Planning,
10th	1st	Recruitment, Sources of manpower, Selection process
	2nd	Method of Testing, Methods of Training & Development, Payment of Wages
	3rd	**Doubt Clearing Class and practice**
	4th	Leadership: Definition and Need/Importance qualities of aleader
11th	1st	Leadership: qualities of a leader
	2nd	Functions of a leader and Manager Vs Leader
	3rd	Style of Leadership (Autocratic, Democratic, Participative)
	4th	Motivation : Definition and characteristics and Importance ofmotivation
12th	1st	Factors affecting motivation and Theories of motivation(Maslow)
	2nd	Methods of Improving Motivation, Importance of Communication in Business, Types and Barriers of Communication
	3rd	**Practice test**
	4th	Work Culture, TQM & Safety :Human relationship and Performance in Organization, Relations with Peers, Superiors and Subordinates
13th	1st	TQM concepts: Quality Policy, Quality Management

	2nd	Quality system, Accidents and Safety, Causes of accident
	3rd	Preventive measures, General Safety Rules , Personal Protection Equipment(PPE)
	4th	Legislation: Intellectual Property Rights(IPR) ,Patents, Trademarks and copyrights
14th	1st	Features of Factories Act 1948 with Amendment (onlysalient points) ,Features of Payment of Wages Act 1936 (only salient points)
	2nd	Smart Technology : Concept of IOT, How IOT works
	3rd	Components of IOT, Characteristics of IOT, Categories of IOT
	4th	Applications of IOT: Smart Cities, Smart Transportation, Smart Home
15th	1st	Smart Healthcare, Smart industry, Smart Agriculture, Smart Energy Management etc
	2nd	**Doubt Clearing Class and Practice**
	3rd	**Quiz test**
	4th	**Practice Test**

Signature of Concerned Teacher

UMA CHARAN PATNAIK ENGINEERING SCHOOL, BERHAMPUR

LESSON PLAN

SESSION-2025-26

SUBJECT: DESIGN OF MACHINE ELEMENTS (THEORY- 02)

DEPARTMENT OF MECHANICAL ENGINEERING

Discipline: Mechanical Engineering	Semester: 5th	Name of the Teaching Faculty: DEBASHISH BISI
Subject (Th-2): DESIGN OF MACHINE ELEMENTS	No of Days/Week Class Allotted: 04	No of Week: 15
WEEK	**CLASS DAY**	**THEORY TOPICS**
1	1ST	**CH.1** Introduction to Machine Design, course outcomes.
	2nd	Classification of machine design, Stresses related to machine design, Stress concentration
	3rd	Engineering materials used in design, properties of material.
	4th	Stress-strain curve for ductile and brittle material (Mild steel& Cast iron)
2	1st	Working stress, yield stress, ultimate stress. Factor of safety for Ductile and brittle material.
	2nd	Modes of failure(elastic deflection, yielding & fracture)
	3rd	Factors governing the design of machine elements
	4th	General procedure in machine design
3	1ST	**CH.2.** Fastening elements and types of fastening
	2nd	Welding and types of welded joints.
	3rd	Advantages and disadvantages of welded joints over other joints
	4th	Strength of transverse and parallel fillet welded joint
4	1st	Simple numerical on welding joint
	2nd	Design of welded joints for eccentric loads
	3rd	Different cases of eccentric load and derivations
	4th	Numericals on eccentric loaded welding joint.
5	1st	Riveted joint, types of riveted joint.
	2nd	Failures of riveted joint.
	3rd	Determination of strength and efficiency of riveted joint.
	4th	Design of riveted joint for pressure vessel(boiler)
6	1st	Numericals on design of riveted joints.
	2nd	Numericals on design of riveted joints.
	3rd	Class test.
	4TH	**CH.3.** Introduction to shaft, functions, materials of shaft
7	1st	Design of shaft on basis of strength
	2nd	Design of shaft on basis of strength
	3rd	Design of shaft on basis of rigidity
	4th	Design of shaft on basis of rigidity
8	1st	Numericals on design of shafts
	2nd	Numericals on design of shafts
	3rd	Function of keys, types of keys
	4th	Material of keys, Failures of key, causes, effect of keyway
9	1st	Design rectangular sunk key and solving numericals
	2nd	Design rectangular sunk key and solving numericals
	3rd	Numericals on empirical relation of rectangular sunk key
	4th	Specifications of parallel, gib head, taper key
	1st	Class work on key and shaft

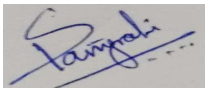
10	2nd	**CH.4.** Introduction to coupling, design of shaft coupling
	3rd	Requirements of a good shaft coupling. Types of coupling.
	4th	Design of sleeve coupling
11	1st	Design of clamp or compression coupling
	2nd	Numerical on design of coupling.
	3rd	Numerical on design of coupling.
	4th	**CH.5.** Introduction to spring and types (open and closed)
12	1st	Materials used and application of spring
	2nd	SWG, specifications of spring.
	3rd	Spring terms for compression type
	4th	Different stresses in helical spring(circular)
13	1st	Different stresses in helical spring(circular)
	2nd	Deflection of helical spring of circular wire
	3rd	Numerical on deflection of helical spring
	4th	Surge in spring and how to avoid it
14	1st	Design of closed coil helical compression spring
	2nd	Design of closed coil helical compression spring
	3rd	Numerical on design of spring
	4th	Numerical on design of spring
15	1st	Doubt clearing of all topics of subject
	2nd	Model question paper practice
	3rd	Model question paper practice
	4th	Closing of subject, course outcomes

TOTAL PERIODS: 60
NO. OF WEEKS: 15

LESSON PLAN OF MECHANICAL ENGINEERING DEPARTMENT WINTER 2025

Discipline: Mechanical		Semester: 5th	Name of Faculty: Sushri Priyanka Panigrahi	
Subject:Theory-3 Hydraulic Machines & Industrial Fluid Power		No of Days per week class allotted	Semester From: 14th July 2025 to 15th November 2025	
Week	Class No	Class days	Chapter	Theory Topic
1st	1	1st	1	Definition and classification of hydraulic turbines
	2	2nd		Construction of impulse turbine
	3	3rd		working principle of impulse turbine
	4	4th		Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine.
2nd	5	1st		Numericals
	6	2nd		Numericals
	7	3rd		Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine.
	8	4th		Numericals
3rd	9	1st		Numericals
	10	2nd		Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine
	11	3rd		Numericals
	12	4th		Numericals
4th	13	1st		Distinguish between impulse turbine and reaction turbine.
	14	2nd		Overall Revision of the chapter-01
	15	3rd		Previous semester question Discussion
	16	4th	2	Construction and working principle of centrifugal pumps
5th	17	1st		Work done and derivation of various efficiencies of centrifugal pumps.
	18	2nd		Numerical on above
	19	3rd		Overall Revision of the chapter-02
	20	4th		Previous semester question Discussion
6th	21	1st	3	Describe construction & Working of single acting reciprocating pump.
	22	2nd		Derive the formula for power required to drive the Single acting pump
	23	3rd		Definition of slip (positive & negative slip)
	24	4th		Relation between slip & coefficient of discharge.
7th	25	1st		Numericals
	26	2nd		Describe construction & Working of double acting reciprocating pump.
	27	3rd		Derive the formula for power required to drive the double acting pump

	28	4th		Numericals
8th	29	1st		Overall Revision of the chapter-03
	30	2nd		Previous semester question Discussion
	31	3rd	4	Introduction to pneumatic control system
	32	4th		Elements –filter-regulator-lubrication unit
9th	33	1st		Pressure control valves: Pressure relief valves
	34	2nd		Pressure control valves: Pressure regulation valves
	35	3rd		Direction control valves: 3/2DCV,5/2 DCV,5/3DCV
	36	4th		Direction control valves: Flow control valves
10th	37	1st		Direction control valves: Throttle valves
	38	2nd		ISO Symbols of pneumatic components
	39	3rd		Pneumatic circuits: Direct control of single acting cylinder
	40	4th		Pneumatic circuits: Operation of double acting cylinder
11th	41	1st		Pneumatic circuits: Operation of double acting cylinder with metering in & metering out control
	42	2nd		Overall Revision of the chapter-04
	43	3rd		Previous semester question Discussion
	44	4th	5	Hydraulic system, its merit and demerits
12th	45	1st		Hydraulic accumulators: Pressure control valves
	46	2nd		Hydraulic accumulators: Pressure relief valves
	47	3rd		Hydraulic accumulators: Pressure regulation valves
	48	4th		Direction control valves: 3/2DCV,5/2 DCV,5/3DCV
13th	49	1st		Direction control valves: Flow control valves
	50	2nd		Direction control valves: Throttle valves
	51	3rd		Fluid power pumps: External and Internal gear pumps
	52	4th		Fluid power pumps: Vane pump
14th	53	1st		Fluid power pumps: Radial piston pumps
	54	2nd		ISO Symbols for hydraulic components,Actuators
	55	3rd		Hydraulic circuits: Direct control of single acting cylinder
	56	4th		Hydraulic circuits: Operation of double acting cylinder
15th	57	1st		Hydraulic circuits: Operation of double acting cylinder with metering in and metering out control
	58	2nd		Comparison of hydraulic and pneumatic system
	59	3rd		Overall Revision of the chapter-05
	60	4th		Previous semester question Discussion



Signature of the faculty

UCPES,BERHAMPUR

LESSON PLAN

Session (2025-2026)

Discipline: Mechanical Engineering	**Semester:** 5th, Winter/2025	**Name of the Teaching Faculty:** Rama Krishna Sahu, Lecturer Stage-II(Mech)
Subject: Mechatronics, Theory-04	**No. of Days/Week:** 04	**Start Date:** 11/07/2025 **End Date:** 15/11/2025

Week	**Class Day**	**Theory/Practical Topics**
1st	1st	**INTRODUCTION TO MECHATRONICS:** Definition, Advantages & disadvantages of Mechatronics.
	2nd	Application of Mechatronics, Importance of mechatronics in automation.
	3rd	Components of a Mechatronics System
	4th	*Review class and Discussion*
2nd	1st	**ROBOTICS:** Definition, Function and laws of robotics
	2nd	Types of industrial robots, Advantages, Disadvantages and Applications of robots
	3rd	Robotic systems
	4th	*Review class and Discussion*
3rd	1st	*Assignment Evaluation & Class Test*
	2nd	**SENSORS AND TRANSDUCERS:**
	3rd	Definition and classification of transducer
	4th	Classification of Transducer
4th	1st	Electromechanical Transducers
	2nd	Transducers Actuating Mechanisms
	3rd	Sensors and its classifications
	4th	Displacement &Positions Sensors
5th	1st	Velocity and Motion sensors
	2nd	Force and Pressure sensors.
	3rd	Temperature sensors
	4th	Light sensors

6th	1st	*Review class and Discussion*
	2nd	*Assignment Evaluation & Quiz Test*
	3rd	**ELEMENTS OF CNC MACHINES:** Introduction to Numerical Control of machines
	4th	NC machines
7th	1st	CNC machine
	2nd	CAD and CAM
	3rd	Software and hardware for CAD/CAM, Functioning of CAD/CAM system
	4th	Features and characteristics of CAD/CAM system, Application areas for CAD/CAM
8th	1st	*Review class and Discussion*
	2nd	**Introduction to CNC Machines,** Elements of CNC machines
	3rd	Machine Structure
	4th	Guideways/Slide ways and its types
9th	1st	Drives and types, Spindle drives
	2nd	Feed drive
	3rd	Spindle and Spindle Bearings
	4th	*Review class and Discussion*
10th	1st	*Class Test*
	2nd	**PROGRAMMABLE LOGIC CONTROLLERS(PLC):**
	3rd	Introduction, Definition and Advantages of PLC, Selection and uses of PLC
	4th	Architecture basic internal structures
11th	1st	Input/output Processing and Programming
	2nd	Mnemonics, Master and Jump Controllers
	3rd	*Review class and Discussion*
	4th	*Assignment Evaluation & Class Test*
12th	1st	**MECHANICAL ACTUATORS:**
	2nd	Machine, Kinematic Link, Kinematic Pair
	3rd	Mechanism, Slider crank Mechanism
	4th	Gear Drive, Spur gear, Bevel gear, Helical gear, worm gear
13th	1st	Belt & Belt drive
	2nd	**Electrical Actuator:** Switches and relays, Solenoids
	3rd	D.C Motors
	4th	A.C Motors
14th	1st	Stepper Motors, Specification and control of stepper motors
	2nd	Servo Motors D.C & A.C

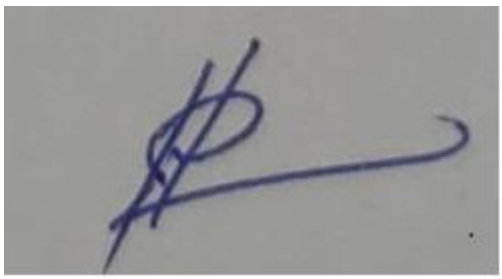
	3rd	*Review class*
	4th	*Assignment Evaluation & Quiz Test*
15th	1st	*Class Test*
	2nd	*Revision*
	3rd	*Revision*
	4th	*Discussion of Previous Year Questions*

Signature of Concerned Teacher

LESSON PLAN-5TH SEMESTER ACADEMIC SESSION WINTER 2025, Start Date: 11/07/2025 End Date: 15/11/2025				
Subject- [**TH.5]** **REFRIGERATION AND AIR CONDITIONING**				
Name of the Faculty- **HADU BANDHU DAKUA**				
MONTH	CHAPTER /UNIT	COURSE TO BE COVERED	CLASSES REQUIRED	REMARKS (IF ANY)
	Chapter-1	**AIR REFRIGERATION CYCLE.**	**05**	
	1.1	Definition of refrigeration and unit of refrigeration.	2	
	1.2	Definition of COP, Refrigerating effect (R.E)	1	
	1.3	Principle of working of open and closed air system of refrigeration.	1	
	1.3.1	Calculation of COP of Bell-Coleman cycle and numerical on it.	1	
	Chapter -2	**SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM**	**10**	
	2.1	Layout of steam power stations	1	
	2.2 **2.2.1** **2.2.2**	Types Cycle with dry saturated vapors after compression. Cycle with wet vapors after compression	2	
	2.2.3 **2.2.4**	Cycle with superheated vapors after compression. Cycle with superheated vapors before compression	2	
	2.2.5 **2.2.6**	Cycle with sub cooling of refrigerant Representation of above cycle on temperature entropy and pressure enthalpy diagram	3	
	2.2.7	Numerical on above (determination of COP, mass flow)	2	
	Chapter-3	**VAPOUR ABSORPTION REFRIGERATION SYSTEM**	**07**	
	3.1	Simple vapor absorption refrigeration system	1	
	3.2	Practical vapor absorption refrigeration system	2	
	3.3	COP of an ideal vapor absorption refrigeration system	2	
	3.4	Numerical on COP.	2	
	Chapter-4	**REFRIGERATION EQUIPMENTS**	**08**	
	4.1 4.1.1	REFRIGERANT COMPRESSORS Principle of working and constructional details of reciprocating and rotary compressors. .	1	

	4.1.2 4.1.3	Centrifugal compressor only theory Important terms	1	
	4.1.4	Hermetically and semi hermetically sealed compressor	1	
	4.2 4.2.1	**CONDENSERS** Principle of working and constructional details of air cooled and water cooled condenser	1	
	4.2.2 4.2.3	Heat rejection ratio. Cooling tower and spray pond.	1	
	4.3 4.3.1	**EVAPORATORS** Principle of working and constructional details of an evaporator.	1	
	4.3.2 **4.3.3**	Types of evaporator. Bare tube coil evaporator, finned evaporator, shell and tube evaporator.	2	
	Chapter-5	**REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS**	**10**	
	5.1 **5.1.1** **5.1.2**	EXPANSION VALVES Capillary tube Automatic expansion valve	2	
	5.1.3	Thermostatic expansion valve	1	
	5.2	REFRIGERANTS Classification of refrigerants Desirable properties of an ideal refrigerant.	1	
	5.2.3	Designation of refrigerant.	1	
	5.2.4 **5.2.5**	Thermodynamic Properties of Refrigerants. Chemical properties of refrigerants.	1	
	5.6	commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717 Substitute for CFC	1	
	5.3 **5.3.1** **5.3.2**	Applications of refrigeration Cold storage Dairy refrigeration	1	
	5.3.3 **5.3.4**	Ice plant water cooler	1	
	5.3.5	Frost free refrigerator	1	
	Chapter-6	**PSYCHOMETRICS &COMFORT AIR**	**10**	

	6.1	**CONDITIONING SYSTEMS** Psychometric terms	**1**	
	6.2	Adiabatic saturation of air by evaporation of water	**1**	
	6.3	Psychometric chart and uses.	1	
	6.4 **6.4.1** **6.4.2**	Psychometric processes Sensible heating and Cooling Cooling and Dehumidification	2	
	6.4.3	Heating and Humidification	1	
	6.4.4 **6.4.5** **6.4.6**	Adiabatic cooling with humidification Total heating of a cooling process SHF, BPF	1	
	6.4.7 **6.4.8**	Adiabatic mixing Problems on above.	2	
	6.5	Effective temperature and Comfort chart	1	
	7.0	**AIR CONDITIONING SYSTEMS**	**10**	
	7.1 **7.2**	Factors affecting comfort air conditioning. . Equipment used in an air-conditioning.	3	
	7.3	Classification of air-conditioning system	1	
	7.4 **7.5**	Winter Air Conditioning System Summer air-conditioning system	2	
	7.6	Numerical on above	4	



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