

LESSON PLAN

- 1) **Subject Code:** Th.1
- 2) **Subject Title:** Entrepreneurship and Management & Smart Technology
- 3) **Semester:** 5th
- 4) **Branch:** Civil & Mech.
- 5) **Faculty:** Jitendra Kumar Das
- 6) **No. of Classes / Week:** 3
- 7) **Pre Requisite for the Subject:** NIL / YES, If YES, give details:
- 8) **Text Book to be referred by students:**

Sl No.	Book	Author	Publication	% of Questions Asked	Year (Edition)	Whether available in Library
i	Entrepreneurship and Management & Smart Technology	B. BADHAI	Dhanpat Rai and Sons	90	2007	Yes

9) Course Coverage Schedule

Ch. No.	Name of the Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remark
01	ENTREPRENEURSHIP	1.1 Concept /Meaning of Entrepreneurship	01	05 Week(1-2)	
		1.2 Need of Entrepreneurship			
		1.3 Characteristics, Qualities and Types of entrepreneur, Functions	01		
		1.4 Barriers in entrepreneurship			
		1.5 Entrepreneurs vrs. Manager	01		
		1.6 Forms of Business Ownership: Sole proprietorship, partnership forms and others			
02	MARKET SURVEY AND OPPORTUNITY IDENTIFICATION(BUSINESS PLANNING)	1.7 Types of Industries, Concept of Start-ups	01	03 Week-(2-3)	
		1.8 Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC, OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.	01		
		1.9 Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks			
		1001 Topic End			
		2.1 Business Planning	01		
		2.2 SSI, Ancillary Units, Tiny Units, Service sector Units			
03	PROJECT REPORT PREPARATION	2.3 Time schedule Plan, Agencies to be contacted for Project Implementation	01	02 Week-(3-4)	
		2.4 Assessment of Demand and supply and Potential areas of Growth			
		2.5 Identifying Business Opportunity	01		
		2.6 Final Product selection			
		1002 Topic End			
		3.1 Preliminary project report	01		
04	MANAGEMENT PRINCIPLES	3.2 Detailed project report, Techno economic Feasibility	01	03 Week-(4-5)	
		3.3 Project Viability			
		1003 Topic End			
		4.1 Definitions of management	01		
		4.2 Principles of management			
		4.3 Functions of management (planning, organising, staffing, directing and controlling etc.)	01		
05	FUNCTIONAL AREAS OF MANAGEMENT	4.4 Level of Management in an Organisation	01	06 Week-(5-6-7)	
		1004 Topic End			
		5.1 Production management	01		
		5.1.1 Functions, Activities			
		5.1.2 Productivity			
		5.1.3 Quality control			
		5.1.4 Production Planning and control			
		5.2 Inventory Management	01		
		5.2.1 Need for Inventory management			

		5.2.2 Models/Techniques of Inventory management			
		5.3 Financial Management	01		
		5.3.1 Functions of Financial management			
		5.3.2 Management of Working capital			
		5.3.3 Costing (only concept)			
		5.3.4 Break even Analysis	01		
		5.3.5 Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)			
		5.4 Marketing Management	01		
		5.4.1 Concept of Marketing and Marketing Management			
		5.4.2 Marketing Techniques (only concepts)			
		5.4.3 Concept of 4P s (Price, Place, Product, Promotion)			
		5.5 Human Resource Management	01		
		5.5.1 Functions of Personnel Management			
		5.5.2 Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training& Development, Payment of Wages			
		1005 Topic End			
06	LEADERSHIP AND MOTIVATION	6.1 Leadership	01	03 Week-(7-8)	
		6.1.1 Definition and Need/Importance			
		6.1.2 Qualities and functions of a leader			
		6.1.3 Manager Vs Leader			
		6.1.4 Style of Leadership (Autocratic, Democratic, Participative)	01		
		6.2 Motivation			
		6.2.1 Definition and characteristics			
		6.2.2 Importance of motivation	01		
		6.2.3 Factors affecting motivation			
		6.2.4 Theories of motivation (Maslow)			
6.2.5 Methods of Improving Motivation					
6.2.6 Importance of Communication in Business	01				
6.2.7 Types and Barriers of Communication					
		1006 Topic End			
07	WORK CULTURE, TQM& SAFETY	7.1 Human relationship and Performance in Organization	01	02 Week-8	
		7.2 Relations with Peers, Superiors and Subordinates			
		7.3 TQM concepts: Quality Policy, Quality Management, Quality system	01		
		7.4 Accidents and Safety, Cause, preventive measures, General Safety Rules, Personal Protection Equipment(PPE)			
		1007 Topic End			
08	LEGISLATION	8.1 Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights	01	02 Week -9	
		8.2 Features of Factories Act 1948 with Amendment (only salient points) c)	01		
		8.3 Features of Payment of Wages Act 1936(only salient points)			
		1008 Topic End			
09	SMART TECHNOLOGY	9.1 Concept of IOT, How IOT works	01	04 Week(9-10)	
		9.2 Components of IOT, Characteristics of IOT, Categories of IOT	01		
		9.3 Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc	02		
		1009 Topic End			

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LESSON PLAN

- 1) Subject Code: Th-2
- 2) Subject Title: Design of Machine Element
- 3) Semester: 5th
- 4) Branch: Mechanical Engineering
- 5) Faculty: Amarendra Mishra
- 6) No. of Classes / Week: 04 classes/week
- 7) Pre Requisite for the Subject: NIL / YES, if YES, give details: Engineering mechanics
Mechanical Engineering Drawing, Strength of material, Engineering Material
- 8) Text Book to be referred by students:

SI No.	Book	Author	Publication	% of Questions Asked	Year (Edition)	Whether available in Library
i	Design of Machine Elements	R S Khurmi & J K Gupta	Eurasia Publishing House (Pvt.) Ltd	90%	1 st Multi color Edition	Yes

9) Course Coverage Schedule:

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
01	Introduction	1.1 Introduction to Machine Design and Classify it.	02	10 Classes Week(1st – 2nd -3rd)	
		1.2 Different mechanical engineering materials used in design with their uses and their mechanical and physical properties	02		
		1.3 Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I	02		
		1.4 Modes of Failure (By elastic deflection, general yielding & fracture)	02		
		1.5 State the factors governing the design of machine elements.	02		
02	Design of fastening elements	2.1 Joints and their classification	01	10 Classes Week (3rd - 4th – 5th)	
		2.2 State types of welded joints.			
		2.3 State advantages of welded joints over other joints			
		2.4 Design of welded joints for eccentric loads.	01		
		2.5 State types of riveted joints and types of rivets.	01		
		2.6 Describe failure of riveted joints.	01		
		2.7 Determine strength & efficiency of riveted joints.	01		
		2.8 Design riveted joints for pressure vessel.	01		
		2.9 Solve numerical on Welded Joint and Riveted Joints.	04		

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
03	Design of shafts and Keys	3.1 State function of shafts.	01	08 Classes Week(6th – 7th)	
		3.2 State materials for shafts.			
		3.3 Design solid & hollow shafts to transmit a given power at given rpm based on a) Strength: (i) Shear stress, (ii) Combined bending tension; b) Rigidity: (i) Angle of twist, (ii) Deflection, (iii) Modulus of rigidity	01		
		3.4 State standard size of shaft as per I.S.	01		
		3.5 State function of keys, types of keys & material of keys.	01		
		3.7 State function of keys, types of keys & material of keys.	01		
		3.8 Design rectangular sunk key by using empirical relation for given diameter of shaft.	01		
		3.9 State specification of parallel key, Gib-head key, taper key as per I.S.			
		3.10 Solve numerical on Design of Shaft and keys.	02		
04	Design of Coupling	4.3,4.2 Types of Coupling. Requirements of a good shaft coupling	01	04 Classes Week (8th)	
		4.1 Design of Shaft Coupling	01		
		4.4 Design of Sleeve or Muff-Coupling.	01		
		4.6 Solve simple numerical on above.	01		
05	Design a closed coil helical spring	5.1 Materials used for helical spring.	01	08 Classes Week (9th – 10th)	
		5.2 Standard size spring wire. (SWG).			
		5.3 Terms used in compression spring.	01		
		5.4 Stress in helical spring of a circular wire.	01		
		5.5 Deflection of helical spring of circular wire.	01		
		5.6 Surge in spring.	01		
		5.7 Solve numerical on design of closed coil helical compression spring.	03		

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LESSON PLAN

- 1) Subject Code: Th3 2) Subject Title: Hydraulic Machines & Industrial Fluid Power
- 3) Semester: 5th 4) Branch: Mechanical Engg.
- 5) Faculty: Nirmal Charan Mallick
- 5) No. of Classes / Week: 04
- 6) Pre Requisite for the Subject: NIL / YES, If YES, give details:
- 7) Text Book to be referred by students:

Sl No.	Book	Author	Publication	% of Questions Asked	Year (Edition)	Whether available in Library
i	A text book of Fluid Mechanics & Hydraulic Machines	Dr. R k Bansal		50%		Available
ii	Hydraulic & Pneumatic Controls	K. Shanmuga Sunderam	S.CHAND	10%		Available
iii	HYDRAULIC & PNEUMATIC CONTROL	MAJUMDAR	TMH	10%		Available

8) Course Coverage Schedule:

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
01	HYDRAULIC TURBINES	1.1 Definition and classification of hydraulic turbines	1	15 Week (1-2-3-4)	
		1.2 Construction and working principle of impulse turbine	1		
		1.3 Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine	4		
		1.4 Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine	3		
		1.5 Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine	3		
		1.6 Numerical on above	3		
		1.7 Distinguish between impulse turbine and reaction turbine			
2	CENTRIFUGAL PUMPS	2.1 Construction and working principle of centrifugal pumps	1	4 Week (4-5)	
		2.2 work done and derivation of various efficiencies of centrifugal pumps.	1		
		2.3 Numerical on above	2		
3	RECIPROCATING PUMPS	3.1 Describe construction & working of single acting reciprocating pump.	1	4 Week (5-6)	
		3.2 Describe construction & working of double acting reciprocating pump.	1		

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
		3.3 Derive the formula for power required to drive the pump (Single acting & double acting) 3.5 Define slip.	1		
		3.5 State positive & negative slip & establish relation between slip & coefficient of discharge. 3.6 Solve numerical on above	1		
4	PNEUMATIC CONTROL SYSTEM	4.1 Elements –filter-regulator-lubrication unit 4.2 Pressure control valves 4.2.1 Pressure relief valves 4.2.2 Pressure regulation valves 4.3 Direction control valves 4.3.1 3/2DCV, 5/2 DCV, 5/3DCV 4.3.2 Flow control valves 4.3.3. Throttle valves 4.4 ISO Symbols of pneumatic components 4.5. Pneumatic circuits 4.5.1 Direct control of single acting cylinder 4.5.2 Operation of double acting cylinder 4.5.3 Operation of double acting cylinder with metering in and metering out control	1 2 2 2 1 1 1	10 Week (6-7-8-9)	
5	HYDRAULIC CONTROL SYSTEM	5.1 Hydraulic system, its merit and demerits 5.2 Hydraulic accumulators 5.3.1 Pressure control valves 5.3.2 Pressure relief valves 5.3.3 Pressure regulation valves 5.3 Direction control valves 5.3.1 3/2DCV, 5/2 DCV, 5/3DCV 5.3.2 Flow control valves 5.3.3 Throttle valves 5.4 Fluid power pumps 5.4.1 External and internal gear pumps 5.4.2 Vane pump 5.4.3 Radial piston pumps 5.5 ISO Symbols for hydraulic components. 5.6 Actuators 5.7 Hydraulic circuits 5.7.1 Direct control of single acting cylinder 5.7.2 Operation of double acting cylinder 5.7.3 Operation of double acting cylinder with metering in and metering out control 5.8 Comparison of hydraulic and pneumatic system	1 1 1 1 1 1 1 1 1	7 Week (9-10)	

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LESSON PLAN

- 1) Subject Code: Th-04
- 2) Subject Title: MECHATRONICS
- 3) Semester: 5th
- 4) Branch: Mechanical
- 5) Faculty: Dipankar Ghosh
- 6) No. of Classes / Week: 03
- 7) Pre Requisite for the Subject: NIL / YES, if YES, give details: NIL
- 8) Text Book to be referred by students:

Sl. No.	Book	Author	Publication	% of Questions Asked	Year (Edition)	Whether available in Library
i	Text book of Mechatronics	R.K Rajput	S. Chand	85	2019	Yes
ii	CAD/CAM	MIKELL GROVER	Tata Mcgraw Hill	15	2010	Yes

9) Course Coverage Schedule:

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
01	Introduction to Mechatronics	1.1 Introduction to Mechatronics Definition of Mechatronics 1.2 Advantages & disadvantages of Mechatronics 1.3 Application of Mechatronics 1.4 Scope of Mechatronics in Industrial Sector 1.5 Components of a Mechatronics System 1.6 Importance of mechatronics in automation 1001 Q/A	01 01	02 Week(1st)	
02	Sensors and Transducers	2.1 Definition of Transducers 2.2 Classification of Transducers 2.3 Electromechanical Transducers 2.4 Transducers Actuating Mechanisms 2.5 Displacement & Positions Sensors 2.6 Velocity, motion, force and pressure sensors 2.7 Temperature and light sensors 1002 Q/A	01 01 02 01 02 01	08 week (1st - 2nd-3rd-4th)	
03	Actuators- Mechanical, Electrical	3.1 Mechanical Actuators 3.1.1 Machine, Kinematic Link, Kinematic Pair 3.1.2 Mechanism, Slider crank Mechanism 3.1.3 Gear Drive, Spur gear, Bevel gear, Helical gear, worm gear 3.1.4 Belt & Belt drive 3.1.5 Bearings 3.2 Electrical Actuator 3.2.1 Switches and relay	01 02 01 01 01		

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
		3.2.2 Solenoid 3.2.3 D.C Motors 3.2.4 A.C Motors	01	09 week (4th - 5th - 6th)	
		3.2.5 Stepper Motors 3.2.6 Specification and control of stepper motors	01		
		3.2.7 Servo Motors D.C & A.C 1003 Q/A	01		
04	Programmable logic controllers	4.1 PROGRAMMABLE LOGIC CONTROLLERS(PLC) 4.2 Introduction 4.3 Advantages of PLC Selection and uses of PLC	01	02 week (6th - 7th)	
		4.4 Architecture basic internal structures 4.5 Input/output Processing and Programming 4.6 Mnemonics 4.7 Master and Jump Controllers 1004 Q/A	01		
05	Elements of CNC Machines	5.1 Introduction to Numerical Control of machines and CAD/CAM 5.1.1 NC machines 5.1.2 CNC machines	01	06 week 7th -8th 9th)	
		5.1.3 CAD/CAM 5.1.3.1 CAD 5.1.3.2 CAM 5.1.3.3 Software and hardware for CAD/CAM	01		
		5.1.3.4 Functioning of CAD/CAM system 5.1.3.5 Features and characteristics of CAD/CAM system 5.1.3.6 Application areas for CAD/CAM	01		
		5.2 Elements of CNC machines 5.2.1 Introduction 5.2.2 Machine Structure 5.2.3 Guideways/Slide ways	01		
		5.2.3.1 Introduction and Types of Guideways 5.2.3.2 Factors of design of guideways 5.4 Drives	01		
		5.4.1 Spindle drives 5.4.2 Feed drive 5.2.5 Spindle and Spindle Bearings 1005 Q/A	01		
06	Robotics	6.1 ROBOTICS Definition, Function and laws of robotics & Function and laws of robotics	01	03 week (9th - 10th)	
		6.2 Types of industrial robots 6.3 Robotic systems	01		
		6.4 Advantages and Disadvantages of robots 1006 Q/A	02		

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LESSON PLAN

- 1) Subject Code: Th-5 2) Subject Title: REFRIGERATION AND AIR CONDITIONING
- 3) Semester: 5th 4) Branch: Mechanical Engg.
- 5) Faculty: Itishree Mishra
- 6) No. of Classes / Week: 4 P/W
- 7) Pre Requisite for the Subject: NIL / YES, If YES, give details:
- 8) Text Book to be referred by students:

Sl No.	Book	Author	Publication	% of Questions Asked	Year (Edition)	Whether available in Library
i	REFRIGERATION AND AIR CONDITIONING	R.S.KHURMI & J.K.GOPTA	S.CHAND	80%	2008	yes

9) Course Coverage Schedule:

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
1.0	AIR REFRIGERATION CYCLE.	1.1 Definition of refrigeration and unit of refrigeration	1	5 Week(1-2)	
		1.2 Definition of COP, Refrigerating effect (R.E)			
		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. 1001 Q&A	3		
2.0	SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM	2.1 schematic diagram of simple vapors compression refrigeration system'	1	5 Week(2-3)	
		2.2 Types	1		
		2.2.1 Cycle with dry saturated vapors after compression.			
		2.2.2 Cycle with wet vapors after compression			
		2.2.6 Representation of above cycle on temperature entropy and pressure enthalpy diagram			
		2.2.7 Numerical on above (determination of COP, mass flow)			
		2.2.3 Cycle with superheated vapors after compression	2		
		2.2.4 Cycle with superheated vapors before compression			
		2.2.6 Representation of above cycle on temperature entropy and pressure enthalpy diagram			
		2.2.7 Numerical on above (determination of COP, mass flow)			

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
		2.2.5 Cycle with sub cooling of refrigerant 2.2.6 Representation of above cycle on temperature entropy and pressure enthalpy diagram 2.2.7 Numerical on above (determination of COP, mass flow) 1002 Q/A	1		
3.0	VAPOUR ABSORPTION REFRIGERATION SYSTEM	3.1 Simple vapor absorption refrigeration system	1	3 Week(3-4)	
		3.2 Practical vapor absorption refrigeration system	1		
		3.3 COP of an ideal vapor absorption refrigeration system 3.4. Numerical on COP. 1003Q/A	1		
4.0	REFRIGERATION EQUIPMENTS	4.1 REFRIGERANT COMPRESSORS 4.1.1 Principle of working and constructional details of reciprocating and rotary compressors.	1	6 Week(4-5)	
		4.1.2 Centrifugal compressor only theory 4.1.3 Important terms. 4.1.4 Hermetically and semi hermetically sealed compressor	1		
		4.2 CONDENSERS 4.2.1 Principle of working and constructional details of air cooled and water cooled condenser 4.2.2 Heat rejection ratio.	1		
		4.2.3 Cooling tower and spray pond	1		
		4.3 EVAPORATORS 1.6.1 Principle of working and constructional details of an evaporator. 1.6.2 Types of evaporator.	1		
		1.6.3 Bare tube coil evaporator, finned evaporator, shell and tube evaporator 1004Q/A	1		
5.0	REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS	5.1 EXPANSION VALVES 5.1.1 Capillary tube 5.1.2 Automatic expansion valve 5.1.3 Thermostatic expansion valve	2	8 Week(5,6-7)	
		5.2 REFRIGERANTS 5.2.1 Classification of refrigerants 5.2.2 Desirable properties of an ideal refrigerant. 5.2.3 Designation of refrigerant.	1		
		5.2.4 Thermodynamic Properties of Refrigerants. 5.2.5 Chemical properties of refrigerants	1		

Ch. No.	Name of Chapter	Course to be Covered	No of periods Required	Total Class for Chapter/ Week (From-To)	Remarks
		5.2.6 commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717 5.2.7 Substitute for CFC	1		
		5.3 Applications of refrigeration 5.3.1 cold storage 5.3.2 dairy refrigeration	1		
		5.3.3 ice plant 5.3.4 water cooler	1		
		5.3.5 frost free refrigerator 1005Q/A	1		
6.0	PSYCHOMETRICS & COMFORT AIR CONDITIONING SYSTEMS	6.1 Psychometric terms	1	8 Week(7,8-9)	
		6.2 Adiabatic saturation of air by evaporation of water	1		
		6.3 Psychometric chart and uses	1		
		6.4 Psychometric processes 6.4.1 Sensible heating and Cooling 6.4.2 Cooling and Dehumidification 6.4.3 Heating and Humidification	2		
		6.4.4 Adiabatic cooling with humidification 6.4.5 Total heating of a cooling process	1		
		6.4.6 SHF, BPF, 6.4.7 Adiabatic mixing 6.4.8 Problems on above	1		
		6.5 Effective temperature and Comfort chart 1006Q/A	1		
7.0	AIR CONDITIONING SYSTEMS	7.1 Factors affecting comfort air conditioning.	1	5 Week(9-10)	
		7.2 Equipment used in an air-conditioning.	1		
		7.3 Classification of air-conditioning system			
		7.4 Winter Air Conditioning System	1		
		7.5 Summer air-conditioning system.	1		
		7.6 Numerical on above 1007Q/A	1		

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