Discipline : **MECHANICAL ENGG**	Semester : **5th**	Name of the Teaching Faculty:- **MR. SABYASACHI JAGANNATH MISHRA.**
Subject: **MACHINE DESIGN**	No. of days/per week class allotted: **04**	No. of Weeks: **15**
Week	Class Day	Theory / Practical Topics
1ST	1ST	Introduction to Machine Design and Classify it.
	2ND	Introduction to Machine Design and Classify it
	3RD	Different mechanical engineering materials used in design with their uses and their mechanical and physical properties
	4TH	Different mechanical engineering materials used in design with their uses and their mechanical and physical properties
2ND	1ST	Different mechanical engineering materials used in design with their uses and their mechanical and physical properties
	2ND	Different mechanical engineering materials used in design with their uses and their mechanical and physical properties
	3RD	Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I. Modes of Failure (By elastic deflection, general yielding & fracture)
	4TH	Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I. Modes of Failure (By elastic deflection, general yielding & fracture)
3RD	1ST	Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I. Modes of Failure (By elastic deflection, general yielding & fracture)
	2ND	State the factors governing the design of machine elements
	3RD	Describe design procedure
	4TH	Describe design procedure
4TH	1ST	Design of fastening elements
	2ND	Joints and their classification.
	3RD	State types of welded joints .
	4TH	State advantages of welded joints over other joints
5TH	1ST	Design of welded joints for eccentric loads.
	2ND	State types of riveted joints and types of rivets
	3RD	Describe failure of riveted joints.
	4TH	Determine strength & efficiency of riveted joints.
6TH	1ST	Design riveted joints for pressure vessel
	2ND	Solve numerical on Welded Joint and Riveted Joint
	3RD	Solve numerical on Welded Joint and Riveted Joint
	4TH	Solve numerical on Welded Joint and Riveted Joint
7TH	1ST	Design of shafts and Keys: State function of shafts. State materials for shafts.
	2ND	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
	3RD	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
	4TH	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
8TH	1ST	State standard size of shaft as per I.S.
	2ND	State function of keys, types of keys & material of keys.
	3RD	Describe failure of key, effect of key way.
	4TH	Design rectangular sunk key considering its failure against shear & crushing.
9TH	1ST	Design rectangular sunk key by using empirical relation for given diameter of shaft
	2ND	State specification of parallel key, gib-head key, taper key as perI.S.
	3RD	Solve numerical on Design of Shaft and keys.
	4TH	Solve numerical on Design of Shaft and keys.
10TH	1ST	**Design of Coupling:** Design of Shaft Coupling.
	2ND	Requirements of a good shaft coupling
	3RD	Types of Coupling.
	4TH	Design of Sleeve or Muff-Coupling
11TH	1ST	Design of Sleeve or Muff-Coupling
	2ND	Design of Clamp or Compression Coupling
	3RD	Design of Clamp or Compression Coupling
	4TH	Design of Clamp or Compression Coupling
12TH	1ST	Solve simple numerical on above
	2ND	Solve simple numerical on above
	3RD	Solve simple numerical on above
	4TH	Solve simple numerical on above
13TH	1ST	**Design a closed coil helical spring:** Materials used for helical spring.
	2ND	Standard size spring wire. (SWG).
	3RD	Terms used in compression spring.
	4TH	Stress in helical spring of a circular wire.
14TH	1ST	Deflection of helical spring of circular wire.
	2ND	Deflection of helical spring of circular wire.
	3RD	Surge in spring.
	4TH	Solve numericalon design of closed coil helical compression

		spring.
15TH	1ST	Solve numericalon design of closed coil helical compression spring.
	2ND	Solve numericalon design of closed coil helical compression spring.
	3RD	Solve numericalon design of closed coil helical compression spring.
	4TH	Solve numericalon design of closed coil helical compression spring.

Learning Resouces:

01. Machine Design by Pandya & Shah, Charotar PP
02. A Textbook of Machine Design by R.S.Khurmi & J.K Gupta, S.Chand
03. A Textbook of Machine Design by P.C.Sharma & D.K.Agrawal,S,K,Kataria
04. Design of Machine Elements by V.B.Bhandari, TMH
05. Design Data Book by S.MD. Jalaudeen, Anuradha Publication

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Sabyasachi Jagannath Mishra
Lect. In Mechanical Engineering
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Discipline :- **MECHANICAL ENGG.**	Semester:- **5th**	Name of the Teaching Faculty:- **SHYAMA PRASAD** **SWAIN**
Subject:- **Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY**	No of Days/per Week Class Allotted :- **5**	No of Weeks:- **15**

Week	Class Day	Theory/ Practical Topics
1st	1st	**Entrepreneurship** Concept /Meaning of Entrepreneurship
	2nd	Need of Entrepreneurship
	3rd	Characteristics, Qualities and Types of entrepreneur, Functions
	4th	Barriers in entrepreneurship
2nd	1	Entrepreneurs vrs. Manager
	2nd	Forms of Business Ownership: Sole proprietorship, partnership forms and others
	3rd	Types of Industries, Concept of Start-ups
	4th	Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
3rd	1th	Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
	2nd	Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks
	3rd	**Market Survey and Opportunity Identification (Business Planning)** Business Planning
	4th	SSI, Ancillary Units,
4th	1st	Tiny Units, Service sector Units
	2nd	Time schedule Plan, Agencies to be contacted for Project Implementation
	3rd	Assessment of Demand and supply and Potential areas of Growth
	4th	Identifying Business Opportunity
5th	1st	Final Product selection
	2nd	**Project report Preparation** Preliminary project report
	3rd	Detailed project report,
	4th	Techno economic Feasibility
6th	1st	Project Viability
	2nd	**Management Principles** Definitions of management
	3rd	Principles of management
	4th	Functions of management (planning, organising, staffing, directing and controlling etc.)
7th	1st	Functions of management (planning, organising, staffing, directing and controlling etc.)
	2nd	Level of Management in an Organisation
	3rd	**Functional Areas of Management** a) Production management Functions, Activities

		Productivity
	4th	• Quality control Production Planning and control

8th	1st	b) Inventory Management
		   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, P&L Accounts, Balance Sheets(only Concepts
9th	1st	Marketing Management Concept of Marketing and Marketing Management
	2nd	Marketing Techniques (only concepts) Concept of 4P s (Price, Place, Product, Promotion)
	3rd	Human Resource Management Functions of Personnel Management
10th	1st	Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages
	2nd	**Leadership and Motivation** Leadership Definition and Need/Importance Qualities and functions of a leader
	3rd	Manager Vs Leader Style of Leadership (Autocratic, Democratic, Participative)
	4th	b) Motivation Definition and characteristics Importance of motivation
11th	1st	Factors affecting motivation Theories of motivation (Maslow)
	2nd	Methods of Improving Motivation Importance of Communication in Business
	3rd	Types and Barriers of Communication
	4th	**Work Culture, TQM & Safety** Human relationship and Performance in Organization
12th	1st	Relations with Peers, Superiors and Subordinates
	2nd	TQM concepts: Quality Policy, Quality Management, Quality system
	3rd	Accidents and Safety, Cause, preventive measures,
	4th	General Safety Rules , Personal Protection Equipment(PPE)
13th	1st	**Legislation** a) Intellectual Property Rights(IPR)
	2nd	Patents, Trademarks, Copyrights
	3rd	b) Features of Factories Act 1948 with Amendment (only salient points)
	4th	c) Features of Payment of Wages Act 1936 (only salient points)
14th	1st	**Smart Technology** • Concept of IOT, How IOT works
	2nd	• Components of IOT, Characteristics of IOT, Categories of IOT

	3rd	• Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.
	4th	• Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

- ## GOVERNMENT POLYTECHNIC JAGATSINGHPUR

MECHANICAL ENGINEERING DEPARTMENT
LESSON PLAN

Discipline :- **MECHANICAL**	Semester:- **5TH**	Name of the Teaching Faculty OMPRAKASH KAR
Subject:- Hydraulic Machines &Industrial Fluid Power Course Code: **TH3**	No of Days/per Week Class **Allotted :-04**	Semester :15 WEEKS
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	Definition of hydraulic turbine, classification of hydraulic turbines
	2nd	Construction and working principle of impulse turbine.
	3rd	Velocity diagram of moving blades, work done of impulse turbine.
	4th	derivation of various efficiencies of impulse turbine.
2nd	1st	Velocity diagram of moving blades, work done of Francis turbine.
	2nd	derivation of various efficiencies of Francisturbine.
	3rd	Velocity diagram of moving blades, work done of various efficiencies of Kaplanturbine
	4th	derivation of various efficiencies of Kaplanturbine
3rd	1st	Numerical
	2nd	Numerical
	3rd	Numerical
	4th	Distinguish between impulse turbine and reaction turbine.
4th	1st	Construction of centrifugal pumps
	2nd	working principle of centrifugal pumps
	3rd	work done and derivation of various efficiencies of centrifugal pumps
	4th	Numerical

5th	1st	Numerical	
	2nd	Describe construction & working of single acting reciprocating pump	
	3rd	Describe construction & working of double acting reciprocating pump.	
	4th	Derive the formula foe power required to drive the pump (Single acting & double acting)	
6th	1st	Define slip.State positive & negative slip &amp	
	2nd	establish relation between slip & coefficient ofdischarge.	
	3rd	numerical	
	4th	numerical	
7th	1st	Elements –filter-regulator	
	2nd	lubrication unit	
	3rd	Pressure control valves	
	4th	Pressure relief valves	
8th	1st	Pressure regulation valves	
	2nd	Direction control valves	
	3rd	3/2DCV,5/2 DCV	
	4th	5/3DCV	
9th	1st	Flow control valves	
	2nd	Throttle valves	
	3rd	ISO Symbols of pneumatic components	
	4th	ISO Symbols of pneumatic components	
10th	1st	Operation of double acting cylinder	
	2nd	Operation of double acting cylinder	
	3rd	Operation of double acting cylinder with metering in	
	4th	Operation of double acting cylinder with metering out control	
11th	1st	Hydraulic system,	
	2nd	its merit and demerits	
	3rd	Hydraulic accumulators	
	4th	Pressure control valves	
12th	1st	Pressure relief valves	
	2nd	Pressure regulation valves	
	3rd	Direction control valves	
	4th	3/2DCV,5/2 DCV	
13th	1st	5/3DCV	
	2nd	Flow control valves	

	3rd	Flow control valves
	4th	Throttle valves
14th	1st	External gear pumps
	2nd	internal gear pumps
	3rd	Vane pump
	4th	Radial piston pumps
15th	1st	ISO Symbols for hydraulic components.
	2nd	Actuators
	3rd	Direct control of single acting cylinder Operation of double acting cylinder
	4th	Operation of double acting cylinder with metering in and metering out control Comparison of hydraulic and pneumatic system

GOVT.POLYTECHNIC,JAGATSINGHPUR

LESSON PLAN

Discipline : Mechanical Engg.	Semester: 5th Sem	Name of the Teaching Faculty: MUKESH KU. DALEI
Subject: Mechatronics	No. Of Days/Week Class Allotted	No. Of Weeks : 15
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	Assignment Evaluation & Class Test
	2nd	**SENSORS AND TRANSDUCERS**: Definition and classification of transducer
	3rd	Classification of Transducer
	4th	Electromechanical Transducers
3rd	1st	Transducers Actuating Mechanisms
	2nd	Sensors and its classifications
	3rd	Displacement &Positions Sensors
	4th	Electromechanical Transducers
4th	1st	Transducers Actuating Mechanisms
	2nd	Sensors and its classifications
	3rd	Displacement &Positions Sensors
	4th	Velocity and Motion sensors
5th	1st	Force and Pressure sensors.
	2nd	Temperature sensors
	3rd	Light sensors
	4th	Review class and Discussion
6th	1st	Assignment Evaluation & Class Test
	2nd	**ROBOTICS:** Definition, Function and laws of robotics

	3rd	Types of industrial robots, Advantages, Disadvantages and Applications of robots
	4th	Robotic systems
7th	1st	Review class and Discussion
	2nd	Assignment Evaluation & Class Test
	3rd	**ELEMENTS OF CNC MACHINES:** Introduction to Numerical Control of machines
	4th	NC machines
8th	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
9th	1st	Review class and Discussion
	2nd	**Introduction to CNC Machines,** Elements of CNC machines
	3rd	Machine Structure
	4th	Guideways/Slide ways and its types
10th	1st	Drives and types, Spindle drives
	2nd	Feed drive
	3rd	Spindle and Spindle Bearings
	4th	Review class and Discussion
11th	1st	Assignment Evaluation & Class Test
	2nd	**PROGRAMMABLE LOGIC CONTROLLERS(PLC):**
	3rd	Introduction, Definition and Advantages of PLC, Selection and uses of PLC
	4th	Architecture basic internal structures
12th	1st	Input/output Processing and Programming
	2nd	Mnemonics, Master and Jump Controllers
	3rd	Review class and Discussion
	4th	Assignment Evaluation & Class Test
13th	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
14th	1st	Belt & Belt drive
	2nd	**Electrical Actuator:** Switches and relays, Solenoids
	3rd	D.C Motors

	4th	A.C Motors
15th	1st	Stepper Motors, Specification and control of stepper motors
	2nd	Servo Motors D.C & A.C
	3rd	Review class
	4th	Assignment Evaluation & Class Test
		Revision
		Revision

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Discipline : **MECHANICAL ENGG**	Semester : **5th**	Name of the Teaching Faculty: : **PRIYABRATA PANDA**
Subject: **RAC**	No. of days/per week class allotted: **04**	No. of Weeks: **15**
Week	Class Day	Theory / Practical Topics
1ST	1ST	**AIR REFRIGERATION CYCLE.** Definition of refrigeration and unit of refrigeration.
	2ND	Definition of COP, Refrigerating effect (R.E)
	3RD	Principle of working of open and closed air system of refrigeration
	4TH	Calculation of COP of Bell-Coleman cycle and numerical on it
2ND	1ST	Calculation of COP of Bell-Coleman cycle and numerical on it
	2ND	**SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM** schematic diagram of simple vapors compression refrigeration system
	3RD	Types Cycle with dry saturated vapors after compression.
	4TH	Cycle with wet vapors after compression.
3RD	1ST	Cycle with superheated vapors after compression
	2ND	Cycle with superheated vapors before compression.
	3RD	Cycle with sub cooling of refrigerant
	4TH	Representation of above cycle on temperature entropy and pressure enthalpy diagram
4TH	1ST	Numerical on above (determination of COP,mass flow)
	2ND	Numerical on above (determination of COP,mass flow)
	3RD	Numerical on above (determination of COP,mass flow)
	4TH	**VAPOUR ABSORPTION REFRIGERATION SYSTEM** Simple vapor absorption refrigeration system
5TH	1ST	Practical vapor absorption refrigeration system
	2ND	COP of an ideal vapor absorption refrigeration system
	3RD	Numerical on COP.
	4TH	Numerical on COP.
6TH	1ST	Numerical on COP.
	2ND	Numerical on COP.
	3RD	**REFRIGERATION EQUIPMENTS** REFRIGERANT COMPRESSORS Principle of working and constructional details of reciprocating and rotary compressors
	4TH	Centrifugal compressor only theory Important terms
7TH	1ST	Hermetically and semi hermetically sealed compressor.
	2ND	**CONDENSERS** Principle of working and constructional details of air cooled and water cooled condenser
	3RD	Heat rejection ratio.

		Cooling tower and spray pond.
	4TH	**EVAPORATORS** Principle of working and constructional details of an evaporator.
8TH	1ST	Types of evaporator.
	2ND	Bare tube coil evaporator, finned evaporator, shell and tube evaporator.
	3RD	**REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATIONOF REFRIGERANTS** EXPANSION VALVES Capillary tube Automatic expansion valve Thermostatic expansion valve
	4TH	REFRIGERANTS Classification of refrigerants
9TH	1ST	Desirable properties of an ideal refrigerant. Designation of refrigerant.
	2ND	Thermodynamic Properties of Refrigerants. Chemical properties of refrigerants.
	3RD	commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717
	4TH	Substitute for CFC
10TH	1ST	Applications of refrigeration cold storage
	2ND	dairy refrigeration
	3RD	ice plant water cooler
	4TH	frost free refrigerator
11TH	1ST	**PSYCHOMETRICS &COMFORT AIR CONDITIONING SYSTEMS** Psychometric terms
	2ND	Adiabatic saturation of air by evaporation of water Psychometric chart and uses.
	3RD	Psychometric processes Sensible heating and Cooling
	4TH	Cooling and Dehumidification Heating and Humidification
12TH	1ST	Adiabatic cooling with humidification Total heating of a cooling process
	2ND	SHF, BPF,

		Adiabatic mixing
	3RD	Problems on above.
	4TH	Problems on above.
13TH	1ST	Problems on above.
	2ND	Effective temperature and Comfort chart
	3RD	**AIR CONDITIONING SYSTEMS** Factors affecting comfort air conditioning. .
	4TH	Equipment used in an air-conditioning
14TH	1ST	Classification of air-conditioning system
	2ND	Winter Air Conditioning System
	3RD	Summer air-conditioning system.
	4TH	Numerical on above
15TH	1ST	Numerical on above
	2ND	Numerical on above
	3RD	Numerical on above
	4TH	Numerical on above

Learning Resouces:

01. **REFRIGERATION AND AIRCONDITIONING BY C.P ARRORA, TMH**
02. **REFRIGERATION AND AIRCONDITIONING BY R.S.KHURMI&J.K.GOPTA, S.CHAND**
03. **REFRIGERATION AND AIRCONDITIONING BY P.L BALLANY, KHANNA PUBLISHER**
04. **REFRIGERATION AND AIRCONDITIONING BY DOMKUNDRA ANDARORA, DHANPAT RAYAND SONS**

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