Name of the Faculty- **Mr. Jasbir Singh**

Discipline- **Mechanical Engineering**

Semester **6th Semester**

Subject and Code - **Refrigeration and Air Conditioning (ME-302N) & Refrigeration and Air Conditioning Lab (ME 312N)**

Lesson Plan Duration - 15 weeks (January,2019 to April, 2019)

Week	Theory		Practical	
	Lecture Day	Topic (Including Assignment/ Test)	Practical Day	Topic
1	1st	Basics of heat pump & refrigerator; Carnot's refrigeration and heat pump; Units of refrigeration;	1st	To study and perform experiment on basic vapour compression Refrigeration Cycle.
	2nd	COP of refrigerator and heat pump; Carnot's COP; ICE refrigeration; evaporative refrigeration;		
	3rd	Refrigeration by expansion of air; refrigeration by throttling of gas; Vapour refrigeration system;		
2	4th	Steam jet refrigeration; thermoelectric cooling; adiabatic demagnetization	2nd	To study and perform experiment on Solar Air-conditioner based on vapour absorption cycle.
	5th	Basic principles of operation of air refrigeration system, Bell-Coleman air refrigerator;		
	6th	Advantages of using air-refrigeration in aircrafts; disadvantages of air refrigeration in comparison to other cold producing methods; simple air refrigeration in air craft;		
3	7th	Simple evaporative type air refrigeration in aircraft;	3rd	To find performance of a refrigeration test rig system by using different expansion devices.
	8th	Necessity of cooling the aircraft.		
	9th	Simple Vapour Compression Refrigeration System; different compression processes(wet compression, dry or dry and saturated compression, superheated compression);		
4	10th	Limitations of vapour compression refrigeration system if used on reverse Carnot cycle;	4th	To study different control devices of a refrigeration system.
	11th	Representation of theoretical and actual cycle on T-S and P-H charts;		
	12th	Effects of operating conditions on the performance of the system; advantages of vapour compression system over air refrigeration system.		
5	13th	Methods of improving COP; flash chamber; flash inter cooler;	5th	To find the performance parameters of Ice Plant.
	14th	Optimum interstate pressure for two stage refrigeration system;		
	15th	Single expansion and multi expansion processes; basic introduction of single load and multi load systems;		
6	16th	Cascade systems.	6th	To find the performance parameter of cooling tower.
	17th	Basic absorption system; COP and Maximum COP of the absorption system; actual NH_3 absorption system;		
	18th	Functions of various components; Li-Br absorption system; selection of refrigerant and absorbent pair in vapour absorption system;		
7	19th	Electro refrigerator; Comparison of Compression and Absorption refrigeration systems;	7th	To find COP of water cooler.
	20th	Nomenclature of refrigerants; desirable properties of refrigerants; cold storage and ice-plants.		.
	21st	Difference in refrigeration and air conditioning;		
8	22nd	Psychometric properties of moist air (wet bulb, dry bulb, dew point temperature, relative and specific humidity of moist air, temperature of adiabatic saturation);	8th	To study various components in room air conditioner.
	23rd	Empirical relation to calculate P_v in moist air.		

	24th	Psychometric chart, construction and use,		
9	25th	Mixing of two air streams;	9^{th}	To find RH of atmospheric air by using Sling Psychrometer
	26th	Sensible heating and cooling; latent heating and cooling; humidification and dehumidification;		
	27th	Cooling with dehumidification; cooling with adiabatic humidification; heating and humidification;		
10	28th	By-pass factor of coil; sensible heat factor; ADP of cooing coil;	10^{th}	Perform the experiment & calculate various performance parameters on a blower apparatus
	29th	Air washer.		
	30th	Classification; factors affecting air conditioning systems; comfort air-conditioning system;		
11	31st	Winter air conditioning system; summer air-conditioning system; year round air conditioning.		
	32nd	Unitary air-conditioning system; central air conditioning system;		
	33rd	Room sensible heat factor;		
12	34th	Grand sensible heat factor;		
	35th	Effective room sensible heat factor;		
	36th	Inside design conditions; comfort conditions; components of cooling loads;		
13	37th	Internal heat gains from (occupancy, lighting, appliances, product and processes);		
	38th	System heat gain (supply air duct, A.C. fan, return air duct);		
	39th	External heat gain (heat gain through building, solar heat gains through outside walls and roofs);		
14	40th	Solar air temperature; solar heat gain through glass areas;		
	41st	Heat gain due to ventilation and infiltration.		
	42nd	Transport air conditioning;		
15	43rd	Evaporative condensers,		
	44th	Cooling towers;		
	45th	Heat pumps.		

Name of the Faculty- **Mr. Surender Kumar**

Discipline - **Mechanical Engineering**

Semester - **6th Semster**

Subject and Code - **Tribology and Mechanical Vibration (ME-304 N)**

Lesson Plan Duration - 15 weeks (January,2019 to April, 2019)

Week	Theory	
	Lecture Day	Topic (Including Assignment/ Test)
1	1st	Introduction to Subject
	2nd	UNIT-1 Elements of a vibratory system
	3rd	S.H.M, Degrees of freedom, Types of vibrations
2	4th	Work done by a harmonic force
	5th	Beats Phenomenon
	6th	Natural frequency by equilibrium and energy methods
3	7th	Equivalent spring, linear and torsional systems
	8th	Compound pendulum
	9th	Bifilar and Trifilar suspensions
4	10th	Different types of damping
	11th	Differential equations of damped free vibrations
	12th	Initial conditions, logarithmic decrement
5	13th	Vibrational energy and logarithmic decrement
	14th	UNIT-2 Sources of excitation
	15th	Equations of motion with harmonic force
6	16th	Response of rotating and reciprocating unbalanced system
	17th	Support motion
	18th	Vibration Isolation
7	19th	Force and Motion transmissibility
	20th	Forced vibrations with coloumb damping
	21st	Forced vibrations with structural damping
8	22nd	Forced vibrations with viscous dampings
	23rd	UNIT-3 Multi-degree of freedom systems
	24th	Principle modes of vibrations
9	25th	Influence co-efficient
	26th	Matrix method
	27th	Orthogonality principle
10	28th	Dunkerleys equation
	29th	Matrix iteration method
	30th	Holzer Method
11	31st	Rayleigh Method
	32nd	Rayleigh-Ritz methods
	33rd	Stodola method
12	34th	Hamilton principle
	35th	Transverse vibrations of strings
	36th	Longitudinal Vibrations of bars
13	37th	Lateral vibration of beams
	38th	Torsional vibration of circular shafts
	39th	Tribology in design, Tribology in industry
14	40th	Lubrication: Basic modes of lubrication
	41st	Lubricants, Properties of lubricants

	42nd	Recycling of used oils and oil conservation
15	43rd	Laws of friction, kinds of friction, causes of friction
	44th	Theories of friction, Effect of surface preparation
	45th	Wear between solids and liquids, Theories of wear

Name of the Faculty- **Mr. Manvir Singh**
Discipline- **Mechanical Engineering**
Semester - **6TH Semester**
Subject and Code - **Operation research (ME-306N)**
Lesson Plan Duration - 15 weeks (January,2019 to April, 2019)

Week	Theory	
	Lecture Day	Topic (Including Assignment/ Test)
1	1st	Introduction to Subject
	2nd	Definition and Development of Operations Research
	3rd	Necessity and Scope of Operations Research in decision making
2	4th	Models in Operations Research
	5th	Fields of application
	6th	Difficulties and limitations of OR
3	7th	Introduction to LPP
	8th	(Minimization And Minimization Problems with or without constraint)
	9th	Formulation of LPP
4	10th	Graphical method and Simplex Method
	11th	The Big M Method
	12th	Degeneracy
5	13th	Application of LPP in mechanical engg
	14th	Assignment No.1
	15th	Mathematical Formulation , stepping stone method
6	16th	Vogel's Approximation Method, modified distribution method
	17th	Least Time Transportation, Assignment Problems
	18th	Solution of balanced and unbalanced transportation problems and case of degeneracy
7	19th	CPM, PERT , network representation ,techniques for drawing network, Numbering of Events (Fulkerson Rule)
	20th	Pert Calculations - Forward Path, Back-Ward Path, Slack
	21st	Probability, Comparison With Pert
8	22nd	Critical Path, Floats, Project Cost
	23rd	Assignment No. 2
	24th	Crashing The Net Work, Updating (PERT And CPM) ,Basic concepts of simulation, Applications of Simulation
9	25th	Advantages And Limitations of Simulation ,Monte Carlo simulation, simulation of inventory system, simulation of queuing system, basic queuing process
	26th	basic structure of queuing models and some commonly known queuing situation, kendall solutions to M/M/1:∞/FCFS models
	27th	Steps in Decision Theory Approach, Decision Making Under Certainty And Uncertainty
10	28th	Decision Making Under Condition of Risk, Decision Trees
	29th	Minimum Enchained Criteria, Advantages And Limitations of Decision Tree Solutions, post optimality
	30th	Queuing Theory, Waiting Time And Idle Time Costs
11	31st	Single Channel Queuing Theory And Multi Channel Queuing Theory With Poisson
	32nd	Arrivals And Exponential Services,
	33rd	Assignment No. 3
12	34th	Numerical on Single Channel And Multi Channel Queuing Theory
	35th	Test
	36th	Theory of Games, Competitive Games, Rules And Terminology In Game Theory
13	37th	Rules For Game Theory- Saddle Point
	38th	Dominance
	39th	Mixed Strategy (2 X2 Games)
14	40th	Mixed Strategy (2 X N Games Or M X 2 Games)
	41st	Mixed Strategy (3 X3 Games)
	42nd	Two Person Zero Sum Games
15	43rd	N Person Zero Sum Game,
	44th	Revision
	45th	Class test

Name of the Faculty- Mr.Viney Vashishth

Discipline - Mechanical Engineering

Semester - 6th Semster

Subject and Code - CAD/CAM (ME-308N)

Lesson Plan Duration - 15 weeks (January,2019 to April, 2019)

Week	Theory		Practical	
	Lecture Day	**Topic (Including Assignment/ Test)**	**Practical Day**	**Topic**
1	1st	Introduction to Subject	1st	To study the 2 dimensional drawing, orthographic views, front view, top view and side view.
	2nd	Introduction to CAD/CAM, Historical Development, Industrial look at CAD/CAM Application of CA/CAM	2nd	
	3rd	Assignment No.1	3rd	
2	4th	Display devices, Input/ Output Devices, CPU,	4th	To study the wireframe, surface and solid modeling.
	5th	Introduction to CIM, Definition, Nature of Elements of CIM, CIM Wheel.	5th	
	6th	Test No.1	6th	
3	7th	Introduction to computer aided quality control, Contact and Non Conduct Inspection Method	7th	Draw the part drawing of product 1 using any 3D software.
	8th	Wireframe modeling, Representation of curves, Parametric and non parametric curves.	8th	
	9th	Assignment No.2	9th	
4	10th	Straight lines, B splines curves.	10th	Draw the part drawing of product 2 using any 3D software
	11th	Plane surface, ruled surface, surface of revolution, bi-cubic surface.	11th	
	12th	Bezier surface, Solid modeling, boundary representation.	12th	
5	13th	Sweeping, parametric solid modeling.	13th	Make assembly by using any 3D software .
	14th	Introduction, Transformation of points & line, 2-D translation, rotation, Reflection, Scaling.	14th	
	15th	Assignment No.3	15th	
6	16th	Shearing and combined transformation	16th	To study the G codes and M codes.

	17th	Homogeneous coordinates.	17th	
	18th	Group technology, Part families,	18th	
7	19th	Test 2	19th	Write a NC program for milling operation.
	20th	Optiz method, product flow analysis.	20th	
	21st	Machine cell Design, Advantages of GT.	21st	
8	22nd	Numerical control, Types of NC systems, MCU & other components.	22nd	Write a NC program for drilling operation.
	23rd	Assignment 4	23rd	
	24th	Co-ordinate system, NC manual part programming.	24th	
9	25th	G & M codes, part program for simple parts.	25th	Write a NC program for turning operation.
	26th	Test 3	26th	
	27th	Computer assisted part programming.	27th	
10	28th	Introduction, FMS component.	28th	To study the optize method.
	29th	Types of FMS.	29th	
	30th	FMS layout.	30th	
11	31st	planning for FMS.	31st	
	32nd	Advantage and applications.	32nd	
	33rd	Introduction, conventional process planning.	33rd	
12	34th	Steps in variant process planning.	34th	
	35th	Test 4	35th	
	36th	Types of	36th	
		CAPP		
13	37th	Planning for CAPP,	37th	
	38th	Part classification and coding.	38th	
	39th	Orthographic and perspective Projections.	39th	
14	40th	Hermite cubic splines.	40th	
	41st	B spline surface.	41st	
	42nd	Assignment 4	42nd	
15	43rd	Doubt Session	43rd	
	44th	Revision	44th	
	45th	Test- Whole Course	45th	

Name of the Faculty- **Mr.Lahna Singh**
Discipline - **Mechanical Engineering**
Semester - **6th Semster**
Subject and Code - **Machine Design-II (ME-310 N)**
Lesson Plan Duration - 15 weeks (January,2019 to April, 2019)

Week	Theory		Practical	
	Lecture	Topic (Including Assignment/ Test)	Practical	Topic
1	1st	Classification of gears, selection of type of gears, law of gearing.	1st	Standard systems of gear tooth, interference and undercutting, backlash.
	2nd	**Spur Gears:** Geometry and nomenclature.	2nd	Force analysis, material selection, beam strength of gear tooth, effective load on gear tooth.
2	3rd	Spur gear design procedure.	3rd	Wear strength of gear tooth, module estimation based on wear strength, Lubrication.
	4th	**Helical Gears:** Geometry and nomenclature.	4th	Force analysis, Virtual no. of teeth, beam strength of gear tooth, effective load on gear tooth.
3	5th	Helical gear design procedure.	5th	Wear strength of gear tooth, module estimation based on wear strength, Lubrication.
	6th	**Bevel Gears:** Geometry and nomenclature.	6th	Force analysis, Virtual no. of teeth, beam strength of gear tooth, effective load on gear tooth.
4	7th	Bevel gear design procedure.	7th	Wear strength of gear tooth, module estimation based on wear strength, Lubrication.
	8th	**Worm Gears:** Terminology.	8th	Force analysis, friction in worm gears, material selection
5	9th	Worm gear design procedure.	9th	Strength rating and wear rating, thermal considerations.
	10th	**Flat Belt Drives:** Introduction.	10th	Selection of flat belts from manufacturer's catalogue.
6	11th	**Flat Belt Pulleys:** Design procedure.	11th	Design of flat belt pulleys.
	12th	**V-Belts and Pulley:** Design procedure.	12th	Selection of V-Belts and V-grooved pulley.
7	13th	**Chain Drives:** Advantages and Dis-advantages.	13th	Roller chains, geometric relationships, polygonal effect, power rating, sprocket wheels, lubrication.
	14th	**Chain Drives:** Design procedure.	14th	Design of chain drives.
8	15th	**Clutches:** Various types of clutches.	15th	Design of friction clutches-single disc, multidisc.
	16th	**Clutches:** Friction materials, thermal considerations.	16th	Design of cone & centrifugal, torque transmitting capacity.
9	17th	**Brakes:** Various types of brakes.	17th	Self-energizing condition of brakes.
	18th	**Brakes:** Thermal considerations in brake designing.	18th	Design of shoe brakes – internal & external expanding, band brakes.
10	19th	**Springs:** Types of springs, Helical Springs, surging in springs.	19th	Design for helical springs against tension and their uses, compression and fluctuating loads.
	20th	**Springs:** Leaf Spring.	20th	Design of leaf springs.
11	21st	**Bearings:** Classification, Rolling Contact Bearing.	21st	Static and dynamic load carrying capacity, equivalent bearing load, load-life relationship, selection of
	22nd	**Bearings:** Rolling Contact Bearing.	22nd	Selection of taper roller bearing, design for cyclic loads and speeds, bearing failure-causes and analysis.
12	23rd	**Bearings:** Sliding Contact Bearing.	23rd	Raimondi and Boyd's Charts.
	24th	**Bearings:** Sliding Contact Bearing.	24th	Design of journal bearings.
13	25th	**Cylinder:** Design procedure.	25th	Design of Cylinder.
	26th	**Piston:** Design procedure.	26th	Design of Piston.
14	27th	**Connecting rod:** Design procedure.	27th	Design of connecting rod.
	28th	**Crank Shaft:** Design procedure.	28th	Design of Crank shaft.
15	29th	**Flywheel:** Flywheel materials.	29th	Torque analysis, coefficient of fluctuation of energy.
	30th	**Flywheel:** Design procedure.	30th	Design of solid disc and rimmed flywheel.