Bachelor of Technology (Mechanical Engineering)

SCHEME OF STUDIES/EXAMINATIONS

Semester – VI

S. No.	Course No.	Course Title	Teaching Schedule				Allotment of Marks				Duration of Exam (Hrs.)
			L	T	P	Hours/ Week	Theory	Sessional	Practical	Total	
1	ME-302N	Refrigeration and Air Conditioning	3	1	0	4	75	25	0	100	3
2	ME-304N	Tribology & Mechanical Vibration	3	1	0	4	75	25	0	100	3
3	ME-306N	Operation Research	3	1	0	4	75	25	0	100	3
4	CSE-209N	Essentials of IT	3	1	0	4	75	25	0	100	3
5	ME-308N	Computer Aided Design and Manufacturing	4	0	0	4	75	25	0	100	3
6	ME-310N	Machine Design-II	2	0	4	6	75	25	0	100	3
7	ME-312N	Refrigeration and Air Conditioning Lab	0	0	2	2	0	40	60	100	3
8	ME-314N	Tribology & Mechanical Vibration Lab	0	0	2	2	0	40	60	100	3
9	ME-316N	Computer Aided Design and Manufacturing Lab	0	0	2	2	0	40	60	100	3
		Total	**18**	**4**	**10**	**32**	**450**	**270**	**180**	**900**	

Note: *All the students have to undergo six weeks industrial training after VIth semester and it will be evaluated in VIIth semester.*

Lesson Plan

Name of the Faculty : **Mr. Bhavender**

Discipline : **Mechanical Engineering**

Semester : **6th**

Subject : **Essentials of IT(CSE-209N)**

Lesson plan : **15Weeks (From January, 2018 to April, 2018)**

Lecture per Week (in Hours) : **Lectures-03**

Week	Theory	
	Lecture Day	Topic(including assignment/test)
1st	1	Problem Solving Techniques: Introduction to Problem Solving,
	2	Introduction to Algorithms and Flowchart,
	3	Searching algorithms: Linear search, Assignment 1 , Searching
2nd	4	Binary search, Sorting algorithms
	5	Insertion and Selection sort,
	6	Test 1, Sorting
3rd	7	Basic Data Structures
	8	Stack, and Linear Queue
	9	Programming Basics: Identifiers, Assignment 2 , Stacks and Queue
4th	10	Variables,
	11	Data Types,
	12	Test 2, Stacks and Queue
5th	13	Control Structures
	14	Operators,
	15	Loop, If else, Assignment 3, Control structure
6th	16	Nested If,
	17	Switch Statement

	18	Test 3, Loops
7th	19	Arrays, Strings,
	20	Object Oriented Concepts: Class & Object,
	21	Operator, Instance Variables & Methods, Assignment 4, Arrays and Strings
8th	22	Access Specifiers, Reference Variables
	23	This, Super,
	24	Test 4, Classes and objects/ arrays and strings
9th	25	Parameter Passing Techniques,
	26	Constructors, Static, and Command Line Arguments
	27	Relationships, Inheritance, Assignment 5, Parameters and arguments
10th	28	Types of Inheritance
	29	Static Polymorphism
	30	Test 5, Inheritance
11th	31	Method Overloading
	32	Constructor Overloading
	33	Method Overriding Assignment 6, Overloading and overriding
12th	34	Abstract, Interface
	35	Introduction to Packages
	36	Test 6, Packages and interface
13th	37	RDBMS: Data Processing, Database Technology, Data Models,
	38	Data Independence, ER Modeling Concept
	39	ER-notations, Assignment 7, DBMS and RDBMS
14th	40	Converting ER Diagram into Relational Schema
	41	Definition of Keys, Primary key, Foreign key, Unique Key
	42	Test 7, ER Diagrams and Schemas
15th	43	DML Statements, ,
	44	DCL Statements, Joins
	45	Sub queries, Views. Assignment 8 Queries and statements.

Books on Java

1. Java: The Complete Reference, Seventh Edition. Herbert Schildt, McGraw-Hill Education. Programming with Java 3e A Primer, E Balagurusamy, McGraw Hill Education.
2. Introduction to Java Programming, K. Somasundaram , Jaico Publishing House; 1st edition

Books on RDBMS, Oracle, MYSQL

1. Fundamentals of Database Systems, with E-book (3rd Edition) by Shamkant B. Navathe, Ramez Elmasri, Published by Addison Wesley Longman , January 15th , 2002
2. MySQL by Paul DuBois Published by New Riders.
3. Murach's MySQL Paperback, Joel Murach , Published by Shroff/Murach, 2012.
4. SQL: The Complete Reference , James R. Groff, Paul N. Weinberg, Published by McGraw-Hill Companies, March 1999.
5. Schaum's Outline of Fundamentals of Relational Databases, Ramon Mata-Toledo, Published by McGraw-Hill, 2000.

NAME of the faculty: MrVipulWadhwa

Discipline: Mechanical

Semester: 6th

Subject: R.A.C

Lesson plan duration: 15 weeks (from January 2018 to April 2018)

Work load (Lecture/Practical) per week (in hours): Lectures -3, Practical's -2

WEEK	THEORY		PRACTICAL	
	Lecture day	Topic	Practical WEEK	Topic
1	1	Basics of Heat Pump & Refrigerator, COP of Refrigerator and Heat Pump	1	Study & Performance of basic vapour compression Refrigeration Cycle using Capillary tube.
	2	Carnot's Refrigeration and Heat pump, Units of Refrigeration, Carnot's COP.		
	3	ICE Refrigeration, Evaporative Refrigeration.		
2	4	Refrigeration by Throttling of Gas	2	To find performance of a refrigeration test rig system by using different expansion devices.
	5	Vapor Refrigeration System, Steam Jet Refrigeration.		
	6	Thermoelectric Cooling, Adiabatic Demagnetization.		
3	7	Basic Principles of Operation of Air Refrigeration System	3	To find COP of water cooler
	8	Bell-Coleman Air Refrigerator		
	9	Advantages of		

		Using Air-Refrigeration in Aircrafts. Disadvantages of air Refrigeration in Comparison to Other Cold Producing Methods.		
4	10	Simple Evaporative Type Air Refrigeration in Aircraft, Necessity of Cooling The Aircraft.	4	To study the walk in cooler
	11	Simple Vapor Compression Refrigeration System.		
	12	Different Compression Processes (Wet Compression, Dry or Dry and Saturated Compression, Superheated Compression).		
5	13	**TEST** on Topics from 1 to 12	5	To find the performance parameters of Ice Plant.
	14	Representation of Theoretical and Actual Cycle on T-S and P-H charts,Effects of Operating Conditions on the Performance of the System		
	15	Methods of Improving COP.		
6	16	Flash Chamber, Flash Inter Cooler, Optimum Interstate	6	To find the performance parameter of cooling tower.

		PressureFor Two Stage Refrigeration System.		
	17	Single Expansion and Multi Expansion Processes		
	18	Basic Introduction of Single Load and Multi Load Systems, Cascade Systems		
7	19	Basic Absorption System, COP and Maximum COP of The Absorption System	7	To study and perform experiment on vapour absorption apparatus.
	20	Actual NH3Absorption System, Functions of Various Components.		
	21	Li-Br Absorption System.		
8	22	Selection of Refrigerant And Absorbent Pair in Vapour Absorption System	8	To study various compressor
	23	Electro Refrigerator, Comparison of Compression and Absorption Refrigeration Systems.		
	24	Psychometric Properties of Moist Air (Wet Bulb, Dry Bulb, Dew Point		

		Temperature).		
9	25	Relative and Specific Humidity of Moist Air		
	26	Temperature of Adiabatic Saturation.		
	27	Empirical Relation to Calculate Pv in Moist Air		
10	28	Psychometric Chart, Construction and Use, Mixing of Two Air Streams		
	29	Humidification and Dehumidification, Cooling With Dehumidification.		
	30	By-Pass Factor of Coil, Sensible Heat Factor; ADP of Cooing Coil, Air Washer.		
11	31	Classification Factors Affecting Air Conditioning Systems, Comfort Air-Conditioning System.		
	32	Winter and Summer Air Conditioning System		
	33	**Test** on topics of 22 to 30		
12	34	Year Round Air Conditioning.		
	35	Unitary Air-Conditioning System		
	36	Central Air Conditioning		

		System.	
13	37	Room Sensible Heat Factor, Grand Sensible Heat factor, Effective Room Sensible Heat Factor.	
	38	Inside Design Conditions, Comfort Conditions, Components of Cooling Loads.	
	39	Internal Heat Gains From (Occupancy, Lighting, Appliances, Product and Processes).	
14	40	System Heat Gain (Supply Air Duct, A.C. Fan, Return Air Duct).	
	41	External Heat Gain (Heat Gain Through Building, Solar Heat Gains Through Outside Walls and Roofs).	
	42	Solar Air Temperature, Solar Heat Gain Through Glass Areas	
15	43	Heat Gain Due to Ventilation and Infiltration	
	44	Transport Air Conditioning, Evaporative Condensers	
	45	Cooling Towers,	

LESSON PLAN

Name : Mr. RAJ KUMAR(Theory&pratical)

Discipline: MECHANICAL ENGG.PEPARTMENT

Semester: 6TH

Subject: M.V. & TRIBOLOGY (ME-304)

Lesson Plan Duration: 15 weeks (from January, 2018 to April, 2018)

Work Load: Lectures-04

Week	Theory		Practical	
	Lecture Day	Topic	Practical day	Topic
1st	1st	**Unit – I: FUNDAMENTALS OF VIBRATIONS:**	1	1. To study undamped free vibrations of equivalent spring mass system and determine the natural frequency of vibrations
	2nd	ELEMENT OF VIBRATION SYSTEM		
	3rd	Simple harmonic motions	2	
	4th	Degree of freedom		
2nd	5th	Types of vibrations	3	2. To study the free vibration of system for different damper settings. Draw decay curve and determine the log decrement and damping factor. Find also the natural frequency
	6th	Work done by harmonic force		
	7th	Undamped free vibration ,	4	
	8th	Natural frequency by equilibirium. Energy method, equivalent spring.		
3rd	9th	Linear and torsional system	5	3. To study the torsional vibration of a single rotor shaft system and to determine the natural frequency.
	10th	Damped free vibration:		
	11th	Different types of damping, differantail equation of damped free vibrations.	6	
	12th	Intail condition lograrithmic decrement.		
4th	13th	Vibrational energy	7	4. To determine the radius of gyration of given bar using bifilar suspension.
	14th	**Unit – II: single degree of freedom system- forced vibration**		
	15th	Source of excitation	8	

	16th	Equation of motion with 9harmonic force		
5th	17th	Response of rotating and reciprocating unbalanced system	9	5. To verify the dunker ley's rule
	18th	Support motion, vibration isolation		
	19th	Forced and motion transmissivity	10	
	20th	Forced vibration with coloumb damping		
6th	21st	Structural and viscous damping	11	6. To study the forced vibration of system with damping. Load magnification factor vs. Frequency and phase angle vs frequency curves. Also determine the damping factor.
	22nd	NUMERICAL		
	23rd	Assignment- 1(Equation of motion with harmonic force)	12	
	24th	test		
7th	25th	**Unit – II1: Multi degree of freedom system:**	13	7. To study the pressure distribution of a journal bearing using a journal bearing apparatus.
	26th	Principle mode of vibrations, influence coefficient ,		
	27th	Matrix method, orthogonalty principle	14	
	28th	Method of harmonic balance.		
8th	29th	Dunkerleys equation, Matrix iteration,	15	8. To determine the rate of wear of a metallic pin from the plot of displacement vs time curves by using friction and wear monitor apparatus.
	30th	Holzer method, Rayleigh method, and Rayleigh-Ritz method		
	31st	Stodola method, Hamilton method	16	
	32nd	Continues system:		
9th	33rd	Transverse vibration of strings, Longitudinal vibrations of bars	17	9. To determine abrasion index of a material with the help of dry abrasion test rig.
	34th	Lateral vibration of beams,		
	35th	Torsional vibration of circular shafts,	18	
	36th	Whirling of shafts.		
10th	37th	numericals	19	10. To evaluate the load

	38th	Assignment-2 (Stodola method, Hamilton method)		wear index and the weld point of a lubricant with the help of a four ball stream pressure tester.
	39th	test	20	
	40th	problems		
11th	41st	**Unit –IV:** introduction to tribology, tribology in design & industry.	21	11. To determine the two frequencies of torsional spring type double pendulum & compare them with theoretical values.
	42nd	Economic aspects of tribology.		
	43rd	LUBRICATIONS:	22	
	44th	Basic modes of lubrications, lubricant, properties of lubricant		
12th	45th	Types of additives,	23	12. To determine the radius of gyration of a compound pendulum.
	46th	Pressure lubricants		
	47th	Recycling of used oils and oil conversion.	24	
	48th	Disposal of scrap oil.		
13th	49th	Friction & wear, law of friction	25	13. To determine the radius of gyration of disc using trifilar suspension.
	50th	Kinds of frictions, causes of friction		
	51st	Friction measurement	26	
	52nd	Theories of friction, effect of surface preparation		
14th	53rd	Introduction, mechanism of wear, types of wear,	27	PRACTICAL- VIVA
	54th	measurement of wear, wears resistance materials		
	55th	Wear between solid & liquids	28	
	56th	Theory of wear		
15th	57th	problems	29	PRACTICAL- VIVA
	58th	Assignment-3(Theories of friction, Theory of wear)		
	59th	revision	30	
	60th	test		

Lesson Plan

Name of the Faculty : **Mr. Eshan Gupta**

Discipline : **Mechanical Engineering**

Semester : **6th**

Subject : **Operation Research– ME 306 E**

Lesson plan : **15 Weeks(From January, 2018 to April, 2018)**

Lecture per Week (in Hours) : **Lectures-04**

Week	Theory	
	Lecture Day	Topic(including assignment/test)
1st	1.	**Unit: 1** Development of operations Research
	2.	characteristics and scope of operations Research
	3.	Operations Research in Management, Models in operations Research
	4.	**Assignment No 1:** Model Formulation
2nd	5.	Types of mathematical models
	6.	Limitations of operations Research.
	7.	L.P. models, simplex method
	8.	**Test 1:** Different models in operation research
3rd	9.	The algebra of simplex method. (Minimization and Minimization problems)
	10.	The big M method
	11.	Post optimality analysis
	12.	Simplex method
4th	13.	Essence of duality theory
	14.	Application of sensitivity analysis
	15.	**Unit 2:** Introduction to model
	16.	Matrix terminology
5th	17.	Formulation and solution of Transportation model (least cost method, Vogel's Approximation method)
	18.	Least time transportation problems
	19.	**Assignment No 2:** Different transportation models
	20.	**Test 2:** Different transportation models problems
6th	21.	Introduction to net work logic
	22.	Numbering of events (Fulkersen Rule)

	23.	PERT calculations - Forward path, back-ward path
	24.	Slack
7th	25.	comparison with PERT
	26.	Critical path
	27.	Project cost
	28.	crashing the net work
8th	29.	Updating (PERT and CPM).
	30.	Floats
	31.	probability
	32.	**Unit 3:** Introduction and applications of simulation
9th	33.	advantages and limitations of simulation technique
	34.	generation of random numbers
	35.	Time-flow mechanism
	36.	**Assignment No 3:** simulation techniques
10th	37.	simulation languages
	38.	Steps in decision theory approach
	39.	Decision Machinery environment
	40.	Decision machining under certainty and uncertainty, Decision machining under condition of risk
11th	41.	Decision trees, Minimum enchained criteria
	42.	Advantages and limitations of decision tree solutions, post Optimality
	43.	**Test 3:**Simulation techniques and decision trees
	44.	Definition of assignment models
12th	45.	Comparison with transport model
	46.	Mathematical representation of assignment model
	47.	Formulation and solution of argument models
	48.	Variation of the argument model, Alternate optimal solutions
13th	49.	**Assignment 4:** Assignment model and its solution
	50.	**Unit 4:** Introduction and Applications of queuing Theory
	51.	Waiting time and idle time costs
	52.	Single channel queuing theory and multi channel queuing theory with Poisson
14th	53.	Arrivals and Exponential services
	54.	Numerical on single channel and multi channel queuing theory
	55.	**Assignment 5:**Queing theory models
	56.	Theory of games, competitive games , Rules and Terminology in game Theory
15th	57.	Rules for game theory- saddle point, dominance
	58.	Mixed strategy (2 x2 games) , mixed strategy (2 x n games or m x 2 games), mixed strategy (3 x3 games)
	59.	Two person zero sum games, n-person zero sum games
	60.	**Test 4:** Queing Theory and Game theory numerical problems

Text Books: Operations Research - By P.K. Gupta and D.S. Hira

Lesson Plan

Name of the Faculty : **Mr. Anil Kumar**

Discipline : **Mechanical Engineering**

Semester : **6th**

Subject : **CAD/CAM (ME-308 N), CAD LAB(ME-316N)**

Lesson plan : **15 Weeks(From January, 2018 to April, 2018)**

Lecture per Week (in Hours) : **Lectures-04**

Week	Theory		Week	**Practical**
	Lecture Day	Topic(including assignment/test)	Practical Day	
1st	1.	**UNIT I** Introduction to CAD/CAM	1	Introduction about cad
	2.	Historical Development		
	3.	Industrial look at CAD/CAM	2	
	4.	Introduction to CIM Basic of Geometric		
2nd	5.	Solid modeling	3	Basic commands Draw : line, polyline, Construction line, rectangle, polygon. Modify: copy, mirror, offset.
	6.	Coordinate systems		
	7.	Explict, Implict		
	8.	Intrinsic and parametric equation	4	
3rd	9.	Part families	5	Practice of basic commands
	10.	Part classification and coding		
	11.	product flow analysis	6	
	12.	Machine cell Design		
4th	13.	Advantages of GT	7	Basic commands Draw : circle, arc and all arc options, elips, elips arc, make block, insert block, hatching, table. etc.
	14.	**Assignment – I** Solid modeling, Part classification and coding		

	15.	**TEST-I**	8	Modify: scale, strach trim, extand, explode. Etc.
	16.	Transformation of points & line		
5th	17.	2-D rotation	9	Practice of basic commands
	18.	Reflection		
	19.	Scaling and combined transformation	10	
	20.	Homogeneous coordinates		
6th	21.	3-D scaling	11	Co-ordination systems
	22.	shearing, rotation		
	23.	reflection and translation	12	
	24.	combined transformations		
7th	25.	Orthographic and perspective projections	13	Work on 2d drawing
	26.	Algebric and geometric forms		
	27.	tangent & normal blending functions	14	
	28.	Reparametrization Straight line,		
8th	29.	conics, cubic splines	15	Practice of 2d drawings.
	30.	bezier curves and B-spline curves		
	31.	**Assignment – II** 3-D scaling, reflection and translation	16	
	32.	**TEST-II**		
9th	33.	Algebraic and geometric forms	17	Introduction about all Dimensions
	34.	tangent & twist vectors		
	35.	normal blending	18	
	36.	function, reparametrization,		
10th	37.	Sixteen point form	19	Practice of 2d drawings.
	38.	four Curve form		
	39.	Plane surface, ruled surface	20	
	40.	Surface of revolution		
11th	41.	tabulated cylinder Bi-	21	Practice of 2d drawings with

		cubic surface		dimensions
	42.	bezier surface		
	43.	B-spline surface Solid models	22	
	44.	representation scheme B-rep		
12th	45.	CSG, sweep representation	23	
	46.	Cell decomposition		
	47.	spatial occupancy enumeration	24	Modify system of dimensions.
	48.	**Assignment – III** function, reparametrization , B-spline surface Solid models		
13th	49.	**TEST-III**	25	
	50.	Introduction, fixed programmable and flexible automation		
	51.	Types of NC systems, MCU & other components	26	Practice
	52.	Co-ordinate system, NC manual part programming		
14th	53.	G & M codes, part program for simple parts	27	
	54.	Computer assisted part programming		
	55.	FMS component, Types of FMS, FMS layout	28	3d introduction
	56.	Planning for FMS, advantage and applications		
15th	57.	conventional process planning, Steps in variant process planning	29	
	58.	CAPP, planning for CAPP		Practice of 3d
	59.	**Assignment – IV** G & M codes, part program for simple	30	

		parts		
	60.	**TEST-IV**		

Text Books:

1. **CAD/CAM theory & practice (Ibrahim Zeid)**

Lesson Plan

Name of the Faculty : **Mr. Sunil Kumar**

Discipline : **Mechanical Engineering**

Semester : **6th**

Subject : **Machine Design - II– ME 310 N**

Lesson plan : **15 Weeks(From January, 2018 to April, 2018)**

Lecture per Week (in Hours) : **Lectures-04**

Week	Theory	
	Lecture Day	Topic(including assignment/test)
1st	1.	**UNIT I** Classification of Gears; Selection of type
	2.	Law of Gearing, Standard system of Gear tooth
	3.	Various Failure modes
	4.	Interference, undercutting & minimum no. of teeth
2nd	5.	Force Analysis ,Beam strength of Gear tooth
	6.	Effective load on tooth
	7.	Estimation of module based on beam strength and wear strength
	8.	Gear lubrication, materials
3rd	9.	Design Procedure, Gear Box design
	10.	**Assignment-1**Gear lubrication , Design Procedure
	11.	Terminology, Force Analysis
	12.	Virtual no. of teeth, Beam strength
4th	13.	Effective load, Wear strength
	14.	Terminology, force analysis
	15.	beam strength & wear strength
	16.	effective load on gear tooth Terminology
5th	17.	properties, force analysis, friction
	18.	material selection
	19.	**TEST - 1**
	20.	**UNIT II** Design of flat belts &Pulleys
6th	21.	Design /selection of V belts &Pulleys
	22.	Design/selection of wire

	23.	Design/selection of ropes
	24.	Design/selection of chains
7th	25.	Single Plate clutch
	26.	multiple Plate clutch
	27.	Cone clutch
	28.	Problem
8th	29.	External shoe brake
	30.	Internal shoe brakes
	31.	**Assignment – II**multiple Plate clutch , Design/selection of wire
	32.	**TEST-II**
9th	33.	**UNIT III** Coil Springs
	34.	Leaf Springs
	35.	Hydro dynamically lubricated bearings
	36.	Selection of ball bearings
10th	37.	Selection of roller bearings
	38.	Selection of taper roller bearings
	39.	Mechanism Design
	40.	Design of cam
11th	41.	Design of Follower
	42.	Follower Design processing
	43.	Follower Design processing
	44.	Follower Design processing
12th	45.	**Problem**
	46.	**TEST-III**
	47.	**UNIT IV** Design of Cylinder
	48.	Design of Piston
13th	49.	Design of Piston
	50.	Design of Crank shaft
	51.	Design of Crank shaft
	52.	Design of connecting rod
14th	53.	Design of connecting rod
	54.	Design of Crane Hook
	55.	Design of Crane Hook
	56.	Design of Flywheels
15th	57.	Design of Flywheels
	58.	**Problems**
	59.	**Assignment III** Design of Piston , Design of connecting rod
	60.	**TEST-IV**

Text Books:

Machine Design Sharma AggarwalKatson Publishers