


CMR Institute of Technology, Bangalore		
Department: Mechanical Engineering		
Semester: 08 (B.E)		
Engineering Economics	10ME701	Lectures/week: 06
Course Instructor: Prof.Cyril		

### Lesson Plan

Class #	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
<b>Introduction to Engineering Economics</b>				
1-3	TB-2	Engineering Decision-Makers, Engineering and Economics, Problem solving and Decision making, Intuition and Analysis, Tactics and Strategy.	10%	10%
4 – 6	TB-1	Engineering Economic Decision, Maze. Law of demand and supply, Law of returns, Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams	5%	15%
7-9	TB-1	Personal loans and EMI Payment, Exercises and Discussion.	5%	20%
<b>Present-Worth Comparisons</b>				
10-12	TB-1	Conditions for present worth comparisons, Basic Present worth comparisons, Present-worth equivalence, Net Presentworth, Assets with unequal lives, infinite lives	5%	25%
13 - 15	TB-2	Future-worth comparison, Pay-back comparison, Exercises, Discussions and problems.	5%	30%
<b>Equivalent Annual-Worth Comparisons</b>				
16-18	TB-2	Equivalent Annual-Worth Comparison methods, Situations for Equivalent Annual-Worth Comparisons, Consideration of asset life.	5%	35%
19-20	TB-1	Comparison of assets with equal and unequal lives, Use of shrinking fund method, Annuity contract for guaranteed income, Exercises, Problems.	10%	45%


<b>Rate-Of-Return Calculations And Depreciation</b>				
21-24	TB-1	Rate of return, Minimum acceptable rate of return, IRR, IRR misconceptions, Cost of capital concepts.	10%	50%
25-27	TB-3	Causes of Depreciation, Basic methods of computing depreciation charges, Tax concepts, corporate income tax.	10%	60%
<b>Estimating and Costing</b>				
28-30	TB-3	Components of costs such as Direct Material Costs, Direct Labor Costs, Fixed Over-Heads, Factory cost, Administrative Over-Heads, First cost, Marginal cost, Selling price, Estimation for simple components.	15%	65%
<b>Financial Ratio Analysis</b>				
31-33	TB-3	Introduction, Nature of ratio analysis, Liquidity ratios, Leverage ratios, Activity ratios, Profitability ratios, Evaluation of a firm's earning power. Comparative statements analysis. Simple numericals	15%	75%
<b>Financial And Profit Planning</b>				
34-37	TB-3	Introduction, Financial planning, Profit planning, Objectives of profit planning, Essentials of profit planning,	15%	80%
38-42	TB-3	Budget administration, type of budgets, preparation of budgets, advantages, problems and dangers of budgeting. Introduction to Bench Marking of Manufacturing Operation	15%	85%
<b>Introduction, Scope Of Finance, Finance Functions</b>				
43-47	TB-3	Statements of Financial Information: Introduction, Source of financial information, Financial statements	15%	90%
48-52	TB-3	Balance sheet, Profit and Loss account, relation between Balance sheet and Profit and Loss account. Simple Numericals	15%	100%

**Syllabus for Sessionals:**

<b>Sessional #</b>	<b>Syllabus</b>
T1	Class # 01 – 20
T2	Class # 21 - 33
T3	Class # 34 - 52

**Literature:**

<b>Book Type</b>	<b>Code</b>	<b>Author &amp; Title</b>	<b>Edition &amp; Publisher</b>
Text Book	TB-1	<b>Engineering Economy</b> , Riggs J.L., 4 <sup>TH</sup> ed. ,	McGrawHill, 2002
Text Book	TB-2	<b>Engineering Economy</b> , Thuesen H.G.	PHI , 2002
Text Book	TB-3	<b>Industrial Engineering and Management</b> , OP Khanna	,Dhanpat Rai & Sons. 2000

CMR Institute of Technology, Bangalore		
Department: Mechanical Engineering		
Semester: <b>07</b>	Section(s): A & B	
Subject: <b>MECHANICAL VIBRATIONS</b>	<b>10ME72</b>	Lectures/week: 06
Course Instructor: Dr. Vijayananda Kaup		
Course duration: 27 July 2016 – 19 Nov 2016		

### LESSON PLAN

Class No.	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
1-10: July 27 to Aug 06	<b>Unit – 1:</b> Introduction  TB1/RB1/RB2	Class-1: Introduction to the subject; to all the units coming under the subject. Importance of vibration in mechanical design.	10%	10%
		Class-2: Types of vibrations, Definitions, Simple Harmonic Motion (S.H.M.)		
		Class-3: Joining and splitting of waveforms. Numerical examples		
		Class-4 & 5: Beat phenomena. More examples		
		Class-6: Introduction to Fourier Series decomposition of periodic waveform		
		Class 7 to 9: Solving and getting the students to solve problems.		
		Class-10: Recap of all the concepts covered in Unit-1.		
11-24: Aug 06 to Aug 20	<b>Unit – 2:</b> Undamped (1-DOF) Free Vibrations  TB1/RB1/RB2	Class-11: Methods of analysis of un-damped free vibrations of systems. Derivation of natural frequency of spring-mass system.	15%	25%
		Class-12: Springs in series and springs in parallel. Some examples. Various forms of Inertial elements present in the system		
		Class-13: Compound Pendulum. Effect of mass of spring on natural frequency of vibration		
		Class-14: Effect of mass of spring on the natural frequency.		
		Class-15 to 18: Numerical examples of Types -1, 2 and 3		
25-36 Aug 21 to Sep 03	<b>Unit – 3:</b> Damped free Vibrations (1-DOF)  TB1/RB1/RB2	Class-19: Types of damping: Analysis with viscous damping	15%	40%
		Class-20: Derivations for over, critical and under damped systems.		
		Class-21: Response of viscous damped systems for cases of under-damped systems.		
		Class-22: Logarithmic decrement and Problems.		
		Class-23 to 28: Numerical examples		
57-66 Sep 25	<b>Unit – 4:</b> Forced	Class-59: Introduction, Analysis of forced vibration with constant harmonic excitation	10%	90%

to Oct 10	Vibrations (1-DOF)  TB1/RB1/RB2	Class-60: Magnification factor, rotating and reciprocating unbalances		
		Class-61: Excitation of support (relative and absolute amplitudes)		
		Class-62: Force and motion transmissibility		
		Class-63: Energy dissipated due to damping		
		Class-64, 65: Numerical examples		
37-46 Sep 04 to Sep 14	<b>Unit – 5:</b> Measuring Instruments and Whirling of shafts  TB1/RB1/RB2	Class-29: Seismic Instruments – Vibrometers	15%	55%
		Class-30: Seismic Instruments – Accelerometer		
		Class-31: Frequency measuring instruments and Problems		
		Class-32: Whirling of shafts with and without damping		
		Class-33: Discussion of speeds above and below critical speeds		
		Class-34 to 38: Numerical Examples		
47-56 Sep 15 to Sep 24	<b>Unit – 6:</b> Two DOF Systems  TB1/RB1/RB2	Class-39: Principle modes of vibrations, Normal mode and natural frequencies of systems (without damping)	15%	65%
		Class-40: Simple spring mass systems		
		Class-41: Masses on tightly stretched strings		
		Class-42: Double pendulum		
		Class-43: Torsional systems		
		Class-44: Combined rectilinear and angular systems		
		Class-45: Geared systems and problems		
		Class-46: Undamped dynamic vibration absorber		
		Class-47,48: Numerical examples		
67-77 Oct 11 To Oct 21	<b>Unit – 7:</b> Numerical Methods for multi-DOF systems  TB1/RB1/RB2	Class-49: Maxwell's reciprocal theorem	15%	80%
		Class-50: Influence coefficients		
		Class-51: Rayleigh's method		
		Class-52: Dunkerley's method		
		Class-53: Stodola method		
		Class-54: Holzer's method		
		Class-55: Orthogonality of principal modes		
		Class-56: Method of matrix iteration and problems		
		Class-57,58: Numerical examples.		
78-82 Oct 22 To Nov 02	<b>Unit – 8:</b> Modal analysis and Condition Monitoring  TB1/RB1/RB2	Signal analysis, dynamic testing of machines and structures, Experimental modal analysis, Machine condition monitoring and diagnosis.	10%	100%


## SYLLABUS FOR SESSIONALS

Sessional No.	Syllabus
T1	Class No. 01 – 28
T2	Class No. 29 – 58
T3	Class No. 58 – 65

## LITERATURE

Book Type	Code	Author & Title	Publication info	
			Edition & Publisher	ISBN No.
Text Book	TB1	<b>Mechanical Vibrations</b> , S. S. Rao	Pearson Education Inc, 4 <sup>th</sup> edition, 2003.	
References	RB1	<b>Theory of Vibration with Applications</b> , W. T. Thomson, M. D. Dahleh and C. Padmanabhan,	Pearson Education Inc, 5 <sup>th</sup> edition, 2008.	
References	RB2	<b>Mechanical Vibrations</b> : S. Graham Kelly, Schaum's outline Series, Tata McGraw Hill,	Special Indian Edition, 2007	

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CMR Institute of Technology, Bangalore			
Department: Mechanical Engineering			
Semester: 07	Section: A & B		
Hydraulics & Pneumatics	10ME73	Lectures/week: 05	
Course Instructor: Mr. Venkatesh Naik			
Course duration: 25 July 2016 – 19 Nov 2016			

Class #	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
1.	TB1:1.1 TO 1.4 3.2 TO 3.5 5.1 to 5.10 TB2:1.4	<b>UNIT -1: Introduction to Hydraulic Power:</b> Definition of hydraulic system	12.5	12.5
2.		Pascal's law, Advantages , Limitations, Applications		
3.		Structure of hydraulic control system, problems on Pascal's law.		
4.		<b>The source of Hydraulic Power:</b> Pumps Classification of pumps, Pumping theory of positive displacement pumps		
5.		Construction and working of Gear pumps, Vane pumps, Piston pumps		
6.		Fixed and variable displacement pumps, Pump performance characteristics		
7.		Pump Selection factors, problems on pumps.		
8.	TB1:6.1 to 6.9 7.1 to 7.7 TB2: 2.2 to 2.4 5.1 to 5.2	<b>UNIT -2: Hydraulic Actuators and Motors:</b> Classification cylinder and hydraulic motors, Linear Hydraulic Actuators [cylinders], single and double acting cylinder,	12.5	25
9.		Mechanics of Hydraulic Cylinder Loading, mounting arrangements, cushioning		
10.		Special types of cylinders, problems on cylinders,		
11.		Construction and working of rotary actuators such as gear, vane, piston motors,		
12.		Motor Theoretical Torque, Power and Flow Rate, Hydraulic Motor Performance,		
13.	symbolic representation of hydraulic actuators ,Problems			
14.	TB1: 8.1 to 8.8 TB2: 3.4 4.1 to 4.7	<b>UNIT -3: Control Components in Hydraulic Systems:</b> Classification of control valves, Directional Control Valves-Symbolic representation	12.5	37.5
15.		constructional features of poppet, Sliding spool, rotary type		
16.		valves solenoid and Pilot operated DCV, shuttle valve		
17.		Pressure control valves - types, direct operated types and pilot operated types		
18.		Flow Control Valves - compensated and non-compensated FCV		
19.		Needle valve, Temperature compensated, pressure compensated FCV		
20.	Pressure and temperature compensated FCV, symbolic representation, Problems			
21.	TB1:1.5 TB1: 3.9	<b>UNIT -6: Introduction to Pneumatic Control:</b> Definition of pneumatic system, Pneumatic system, advantages, limitations, applications,	12.5	50
22.		Choice of working medium. Characteristic of compressed air.		
23.		Structure of Pneumatic control System, fluid conditioners and FRL unit.		
24.		<b>Pneumatic Actuators:</b> Linear cylinder - Types, Conventional type of cylinder- working,		
25.		End position cushioning, seals, Mounting arrangements-		

		Applications.		
26.		Rod - Less cylinders types, working, advantages		
27.		Rotary cylinders-types construction and application, Symbols.		
28.	TB1:13.8 14.5 to 14.8 16.4 to 16.5	<b>UNIT -7: Pneumatic Control Valves:</b> DCV such as poppet, spool, suspended seat type slide valve, Pressure control valves, flow control valves, types and construction,	12.5	67.5
29.		use of memory valve, Quick exhaust valve, time delay valve, shuttle valve, twin pressure valve, symbols		
30.		Simple Pneumatic Control: Direct and indirect actuation pneumatic cylinders, speed control of cylinders		
31.		Supply air throttling and Exhaust air throttling and Exhaust air throttling.		
32.		<b>Signal Processing Elements:</b> Use of Logic gates - OR and AND gates in pneumatic applications, Practical Examples involving the use of logic gates		
33.		Pressure dependant controls- types - construction – practical applications,		
34.		Time dependent controls principle. Construction, practical applications.		
35.	TB1:9.1 to 9.14 11.3	<b>UNIT -4: Hydraulic Circuit Design And Analysis:</b> Control of Single and Double - Acting Hydraulic Cylinder	12.5	75
36.		Regenerative circuit, Pump Unloading Circuit, Double Pump Hydraulic System		
37.		Counter balance Valve Application, Hydraulic Cylinder Sequencing Circuits		
38.		Automatic cylinder reciprocating, system, Locked Cylinder using Pilot check Valve, Cylinder synchronizing circuit using different methods		
39.		Factors affecting synchronization, Hydraulic circuit for force multiplication, Speed Control of Hydraulic Cylinder		
40.		Speed Control of Hydraulic Motors, Safety circuit, Accumulators, types, construction and applications with circuits		
41.	TB1:6.1 to 6.4 TB2:12.1 to 12.15	<b>UNIT -5: Maintenance of Hydraulic System:</b> Hydraulic Oils - Desirable properties	12.5	87.5
42.		General type of Fluids, Sealing Devices		
43.		Reservoir System, Filters and Strainers		
44.		Wear of Moving Parts due to solid -particle Contamination		
45.		Temperature control (heat exchangers), Pressure switches		
46.		Pressure switches, trouble shooting		
47.	TB1:12.1 to 12.15 TB2:6.1 to 6.4	<b>UNIT -8: Multi- Cylinder Application:</b> Coordinated and sequential motion control, Motion and control diagrams. Signal elimination methods, Cascading method- principle, Practical application examples (up to two cylinders) using cascading method (using reversing valves).	12.5	100
48.		Practical application examples (up to two cylinders) using cascading method (using reversing valves).		
49.		Electro- Pneumatic Control: Principles - signal input and output, pilot assisted solenoid control of directional control valves		
50.		Use of relay and contactors. Control circuitry for simple signal cylinder application		
51.		Compressed Air: Production of compressed air- Compressors Preparation of compressed air-Driers		
52.		Filters, Regulators, Lubricators, Distribution of compressed air Piping layout.		




**Literature:**

Book Type	Code	Author & Title	Publication info	
			Edition & Publisher	ISBN #
Text Book	TB1	"Fluid power with application", Anthony Esposito,	sixth edition, Pearson Education	978-81-775-8580-3
Text Book	TB2	'Pneumatics and Hydraulics' Andrew parr	2 <sup>nd</sup> edition, jaico publishing co	978-0-7506-4419-9

**Syllabus for Internal Assessment Tests (IAT)\***

IAT #	Syllabus
IAT1	1-25
IAT2	25-42
IAT3	43-52

\* See calendar of events for the schedules of IATs.

CMR Institute of Technology, Bangalore		
Department(s): Mechanical Engineering		
Semester: 07	Section(s): A & B	
Operations Research	10ME74	Lectures/week: 06
Course Instructor(s): Mr. Gopi.S		
Course duration: 25 July 2016 – 19 Nov 2016		

Lecture #	Book & Sections	Topics	Portions coverage %	
			Individual	Cumulative
1-4	RB2: Pg 1 To 8 1.1 To 1.6	<b>Introduction</b> Evolution of OR, definition of OR, scope of OR, application areas of OR, steps (phases) in OR study, characteristics and limitations of OR, models used in OR, linear programming (LP) problem-formulation and solution by graphical method.	12.5%	12.5 %
5-12	RB2: Pg 9 To 70 2.1 To 2.7.2	<b>Solution Of Linear Programming Problems</b> The simplex method canonical and standard form of an LP problem, slack, surplus and artificial variables, big M method and concept of duality, dual simplex method.	12.5 %	25 %
13-19	RB2: Pg 71 To 126 3.1 To 3.5.2	<b>Transportation Problem</b> Formulation of transportation problem, types, initial basic feasible solution using different methods, optimal solution by MODI method, degeneracy in transportation problems, application of transportation problem concept for maximization cases. Assignment Problem-formulation, types, application to maximization cases and travelling salesman problem.	12.5%	37.5%
20-26	RB2: Pg 196 To 229 6.1 To 6.5	<b>Integer Programming</b> Pure and mixed integer programming problems, solution of Integer programming problems-Gomory's all integer cutting plane method and mixed integer method, branch and bound method, Zero-One programming.	12.5%	50%
27-36	RB2: Pg 9 To 70 2.1 To 2.7.2	<b>Pert-CPM Techniques</b> Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path method to find the expected completion time of a project, floats; PERT for finding expected duration of an activity and project, determining the probability of completing a project, predicting the completion time of project; crashing of simple projects.	12.5%	62.5%

37-45	RB2: Pg 298 To 354 9.1 To 9.3	<b>Queuing Theory</b> Queuing systems and their characteristics, Pure-birth and Pure-death models (only equations), empirical queuing models – M/M/1 and M/M/C models and their steady state performance analysis.	12.5%	75%
46-53	RB2: Pg 424 To 470 12.1 To 12.6	<b>Game Theory</b> Formulation of games, types, solution of games with saddle point, graphical method of solving mixed strategy games, dominance rule for solving mixed strategy games.	12.5%	87.5%
54-62	RB2: Pg 494 To 537 14.1 To 14.4	<b>Sequencing</b> Basic assumptions, sequencing 'n' jobs on single machine using priority rules, sequencing using Johnson's rule-'n' jobs on 2 machines, 'n' jobs on 3 machines, 'n' jobs on 'm' machines. Sequencing 2 jobs on 'm' machines using graphical method.	12.5%	100%

### Syllabus for Sessional:

Sessional #	Syllabus
T1	Class # 01 – 19
T2	Class # 20 – 45
T3	Class # 46 – 62


### Literature:

Book Type	Code	Author & Title	Publication info	
			Edition & Publisher	ISBN #
Text Book	TB1	Operations Research by P K Gupta and D S Hira	Chand Publications, New Delhi - 2007	
Text Book	TB2	Operations Research by Taha H A	Pearson Education	
Reference Book	RB1	Operations Research by A P Verma,	S K Kataria & Sons, 2008	
Reference Book	RB2	Operations Research by Paneerselvam	Prentice hall of India 2 <sup>nd</sup> edition	9788120329287
Reference Book	RB3	Operations Research by A M Natarajan, P Balasubramani	Pearson Education, 2005	

Staff In-charge (C.I)

(CCI)

HOD-Mechanical Engg

CMR Institute of Technology, Bangalore		
Department(s): Mechanical Engineering		
Semester: 07	Section(s): A	
Non conventional energy sources	10ME754	Lectures/week: 05
Course Instructor(s): Mr. Narendra N		
Course duration: 01-AUG. 2016 –NOV- 2016		

Class #	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
1	RB1 : 1.1 to 1.14	Energy source, India's production and reserves of commercial energy sources.	13.5%	13.5 %
2		need for non-conventional energy sources, energy alternatives, solar,		
3		thermal, photovoltaic		
4		Water power, wind biomass, ocean temperature difference, tidal and waves, geothermal		
5		Tarsands and oil shale, nuclear (Brief descriptions); advantages and disadvantages		
6		comparison (Qualitative and Quantitative).		
8	RB1 : 2.1 to 2.8	Extra-Terrestrial radiation, spectral distribution of extra terrestrial radiation,	13.5 %	27 %
9		solar constant, solar radiation at the earth's surface, beam,		
10		diffuse and global radiation, solar radiation data.		
11		Pyrometer, shading ring pyrheliometer, sunshine recorder,		
12		schematic diagrams and principle of working.		
13		Flux on a plane surface, latitude, declination angle,		
14		surface azimuth angle, hour angle, zenith angle,		
		solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation) local apparent time.		
	Apparent motion of sun, day length, numerical examples.			
15	RB1: 4.1 to 4.10	General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity absorptivity product, numerical examples.	11.5%	38.5%
16		The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided).		
17		Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided).		
18		Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust.		
21		Photosynthesis, photosynthetic oxygen production, energy plantation,		
22		bio gas production from organic wastes by anaerobic		

		fermentation, description of bio-gas plants,		
23	RB2: 7.1 to 7.9	transportation of bio-gas, problems involved with bio-gas production,	11.5%	50%
24		application of bio-gas, application of bio-gas in engines, advantages.		
27	RB2: 8.1 to 8.8	Properties of Hydrogen with respected to its utilization as a renewable form of energy,	11.5%	61.5%
28		sources of hydrogen, production of hydrogen, electrolysis of water, thermal decomposition of water,		
29		thermo chemical production bio-chemical production.		
30		Gaseous, cryogenic and metal hydrides,		
31		application of hydrogen, domestic and industrial safe burning of hydrogen.		
33	RB2: 6.1 to 6.8	Tides and waves as energy suppliers and their mechanics	15.4%	77%
34		fundamental characteristics of tidal power,		
35		tidal energy, limitations.		
36		Principle of working, Rankine cycle, OTEC power stations in the world		
37		problems associated with OTEC.		
38		Principle of working, types of geothermal station with schematic diagram,		
39		geothermal plants in the world, problems associated with geothermal conversion,		
40		scope of geothermal energy		
41	RB1: 3.1 to 3.9	Beam, diffuse and reflected radiation, expression for flux on a tilted surface	11.5%	88.5%
42		numerical examples		
43		Collection and storage, thermal collection devices, liquid flat plate collectors,		
44		solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis);		
45		sensible heat storage, latent heat storage, application of solar energy water heating		
		Space heating and cooling, active and passive systems		
		power generation, refrigeration.		
		Distillation (Qualitative analysis) solar pond,		
46		principle of working, operational problems.		
47	RB1: 5.1 to 5.9	Description, principle of working and characteristics,	11.5%	100%
48		applications.		
49		Properties of wind, availability of wind energy in India, wind velocity and power from wind		
50		major problems associated with wind power, wind machines;		
51		Types of wind machines and their characteristics, horizontal and vertical axis wind mills		
52		elementary design principles; coefficient of performance of a wind mill rotor,		
	aerodynamic considerations of wind mill design, numerical examples.			

**Syllabus for Sessionals :**


Sessional #	Syllabus
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T1	Class # 01 – 17
T2	Class # 15 – 35
T3	Class # 27 – 50

**Literature:**

Book Type	Code	Author & Title	Publication info	
			Edition & Publisher	ISBN #
Text Book	TB1	Non-Conventional Energy Sources by <i>G.D Rai K, Khanna</i>	Khanna Publishers, 2003.	
Text Book	TB2	Renewable Energy Sources and Conversion Technology by <i>N.K.Bansal, Manfred Kleeman &amp; Mechael Meliss</i>	Tata McGraw Hill, 2 <sup>nd</sup> Edition, 1996	
References	RB1	Renewable Energy Resources, <i>John W.Twidell Anthony D. Weir El</i>	Tata McGraw Hill, 2 <sup>nd</sup> Edition, 1996	
References	RB3	B H Khan, “Non Conventional Energy sources”	<i>Weir El, BG 2001.</i>	

# Course Plan

<b>CMR Institute of Technology, Bangalore</b>		
<b>Department: Mechanical Engineering</b>		
Semester: VII (B.E)		
Experimental Stress Analysis	10ME761	Lectures/week: 05
Course Instructor: <b>Prof. Divyesh Mistry</b>		

### Lesson Plan

Class #	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
<b>Introduction to ESA</b>				
1-3	TB-4 1 – 2	Introduction: Overview of ESA, Explanation for all Techniques to find stress strain, Optical Methods work as optical computers, visual Application	5%	5%
<b>Photo-elasticity</b>				
4 – 12	TB-4 4 TB-2 11.1-11.7	Nature of light, Wave theory of light - optical interference , Stress optic law – effect of stressed model in plane and circular polariscopes, Isoclinics & Isochromatics, Fringe order determination Fringe multiplication techniques, Calibration photo-elastic model materials	10%	15%
<b>Two Dimensional Photo-elasticity</b>				
12-18	TB-1 6.1-6.10 & TB-4 4	Separation methods: Shear difference method, Analytical separation methods, Model to prototype scaling, Properties of 2D photo-elastic model materials, Materials for 2D photo-elasticity	10%	25%
<b>Three Dimensional Photo elasticity</b>				
19-24	TB-2 14.1-14.9	Stress freezing method, Scattered light photo-elasticity, Scattered light as an interior analyzer and polarizer, Scattered light polariscope and stress data Analyses	15%	40%

<b>Photoelastic (Birefringent) Coatings</b>				
25 - 32	TB-2 16.1-16.8	Birefringence coating stresses, Effects of coating thickness: Reinforcing effects, Poisson's, Stress separation techniques: Oblique incidence, Strip coatings.	5%	45%
<b>Electrical Resistance Strain Gages</b>				
33-39	TB-2 6.1-6.7 &TB-3 3	Strain sensitivity in metallic alloys, Gage construction, Adhesives and mounting techniques, Gage sensitivity and gage factor, Performance Characteristics, Environmental effects, Strain Gage circuits. Potentiometer, Wheatstone's bridges, Constant current circuits.	10%	55%
<b>Strain Analysis Methods</b>				
40-46	TB-3 4,	Two element, three element rectangular and delta rosettes, Correction for transverse strain effects, Stress gage, Plane shear gage, Stress intensity factor gage	10%	65%
<b>Brittle Coatings</b>				
47-52	TB-3 10.1-10.18 & TB-4 9	Coatings stresses, Crack patterns, Refrigeration techniques, Load relaxation techniques, Crack detection methods, Types of brittle coatings, Calibration of coating. Advantages and brittle coating applications.	20%	85%
<b>Moire Methods</b>				
53-59	TB-2 12	Moire fringes produced by mechanical interference .Geometrical approach, isplacement field approach to Moire fringeanalysis ,Out of plane displacement asurements, Out of plane slope measurements .Applications and advantages .	15%	100%



### Syllabus for Sessionals:

Sessional #	Syllabus
T1	Class # 01 – 18
T2	Class # 19 - 46
T3	Class # 47 - 59

### Literature:

Book Type	Code	Author & Title	Publication info	
			Edition & Publisher	ISBN #
Text Book	TB-1	<b>"Experimental Stress Analysis and Motion Measurement",</b> Richard C.Dove and Paul H.Adams	Second Edition Charles E. Merrill Books.	64-12874
Text Book	TB-2	<b>"Experimental Stress Analysis"</b> Dr. Sadhu Singh	Khanna Publishers	81-7409-182-3
Text Book	TB-3	<b>"Experimental Stress Analysis",</b> Dally and Riley, McGraw Hill	Second Edition McGRAW-HILL	0-07-Y66242-8
Text Book	TB-4	<b>"e-book on Experimental Stress Analysis"</b> K. Ramesh	Published by IIT Madras	978-81-904235-6-4