CMR Institute of Technology, Bangalore		
Department: Mechanical Engineering		
Semester: 07(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
Introduction to Engineering Economics				
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%
Present-Worth Comparisons				
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 compare-son, Exercises, Discussions and problems.	5%	30%
Equivalent Annual-Worth Comparisons				
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%

Rate-Of-Return Calculations And Depreciation				
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%
Estimating and Costing				
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%
Financial Ratio Analysis				
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%
Financial And Profit Planning				
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%
Introduction, Scope Of Finance, Finance Functions				
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:

Sessional #	Syllabus
T1	Class # 01 – 20
T2	Class # 21 - 33
T3	Class # 34 - 52

Literature:

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

CMR Institute of Technology, Bangalore			
Department: Mechanical Engineering			
Semester: **07**	Section(s): A & B		
Subject: **MECHANICAL VIBRATIONS**		**10ME72**	Lectures/week: 06
Course Instructor: Dr. Vijayananda Kaup			
Course duration: Aug 2017 – Nov 2017			

LESSON PLAN

Class No.	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
1-10: Aug 3 to Aug 13	**Unit – 1:** 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.		
11-18: Aug 14 to Aug 24	**Unit – 2:** 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.	10%	20%
		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 Type-1 problems		
19-28 Aug 25 to Sep 04	**Unit – 3:** Damped free Vibrations (1-DOF) TB1/RB1/RB2	Class-19: Types of damping: Analysis with viscous damping	15%	35%
		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		

59-65 Oct 31 to Nov 07	**Unit – 4:** Forced Vibrations (1-DOF) TB1/RB1/RB2	Class-59: Introduction, Analysis of forced vibration with constant harmonic excitation	10%	90%
		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		
29-38 Sep 07 to Sep 23	**Unit – 5:** Measuring Instruments and Whirling of shafts TB1/RB1/RB2	Class-29: Seismic Instruments – Vibrometers	15%	50%
		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		
39-48 Sep 25 to Oct 08	**Unit – 6:** 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		
49-58 Oct 09 To Oct 21	**Unit – 7:** 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.		

	Unit – 8: 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	**Mechanical Vibrations,** S. S. Rao	Pearson Education Inc, 4th edition, 2003.	
References	RB1	**Theory of Vibration with Applications,** W. T. Thomson, M. D. Dahleh and C. Padmanabhan,	Pearson Education Inc, 5th edition, 2008.	
References	RB2	**Mechanical Vibrations:** 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 2017 – 19 Nov 2017			

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	**UNIT -1: Introduction to Hydraulic Power**: 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.		**The source of Hydraulic Power**: 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	**UNIT -2: Hydraulic Actuators and Motors**: 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	**UNIT -3: Control Components in Hydraulic Systems:** 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	**UNIT -6: Introduction to Pneumatic Control**: 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.		**Pneumatic Actuators**: 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	**UNIT -7: Pneumatic Control Valves**: 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.		**Signal Processing Elements**: 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	**UNIT -4: Hydraulic Circuit Design And Analysis**: 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	**UNIT -5: Maintenance of Hydraulic System**: 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	**UNIT -8: Multi- Cylinder Application**: Coordinated and sequential motion control, Motion and control diagrams. Signal elimination methods, Cascading method- principle,	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	2nd edition, jaico publishing co	978-0-7506-4419-9

Syllabus for Internal Assessment Tests (IAT)*

IAT #	Syllabus
IAT1	1-25
IAT2	26-42
IAT3	43-52

* See calendar of events for the schedules of IATs.

CMR Institute of Technology, Bangalore		
Department: Mechanical Engineering		
Semester: 07(B.E)		
Operation research	10ME74	Lectures/week: 06
Course Instructor: Prof. Gopi S		

Lesson Plan

Lecture #	Book & Sections	Topics	Portions coverage %	
			Individual	Cumulative
1 - 11	RB1-1.4,2.2,3.1 TB1-2.4,2.5	**Introduction to OR, Graphical solutions to LPP:** Introduction, Definitions, and Scope of Operation Research / phases of O.R. Applications of OR, L P Problem. Formulation and Graphical Solutions to LPP, Graphical Solutions-Additional problems.	12.5	12.5
12 - 25	RB1-8.3,8.4,8.5, 9.3,9.4,9.6 TB1-2	**Transportation and assignment problems** : Transportation problem - (IBFS Types) , Transportation Optimality by MODI method Maximization TP, Degeneracy in TP, Formulation of Transportation problems, Assignment Problem, - Formulation, Hungarian method of Solutions to Problems, Special cases in Assignment problems, Unbalanced, Maximization cases, Formulate and solve as assignment problems, Traveling Salesman problem .	12.5	25
26 - 31	RB1-19.1,19.3,19.4,19.5.3 RB2-7.9,7.14	**Game theory**: Game Theory, Definitions, Saddle point, Pure strategy problems, Dominance rules, Solution of games using Dominance Mixed strategy problems, Solution of 2X2 games, Graphical solutions for 2Xn games, Solutions to mX2 games.	12.5	37.5
32-38	RB1-15.2,15.5,15.7, TB1-9.1,9.11	**PERT Network analysis**: PERT -CPM Network, Definitions, Constructions of Networks, Time Calculations, Fulkerson's rule of Numbering Nodes, Critical path, Calculations of ES,EF,LS and LF, Floats in Network, PERT- Probability of Completing projects Standard deviation and Variance of Projects, Cost analysis, Crashing of simple projects .	12.5	
39-44	TB1-10.6, 10.2,10.5	**Queing theory**: Queuing Theory– Characteristics, Queing models, Birth and Death process, M/M/I Queing models, Applications of M/M/I models, M/M/C models and analysis, Problems.	12.5	62.5
45-51	RB1-4.2,5.3,6.3, RB2-4.3,5.2	**LPP**: Simplex Method, Standard form, Canonical form, Problems by Simplex, Degeneracy in LPP. Slack and Surplus variables, Big - M Method, Duality in LPP, Properties of duality, Primal - Dual relationship, Dual simplex method, Problems using Dual simplex method.	12.5	75
52-57	RB1-12.1,12.3, 12.4,12.5, 12.6	**Sequencing**: Sequencing- Assumptions, Johnson's rule. Sequencing problems- n jobs on 2 machines, Sequencing problems- n jobs on 3 machines, Sequencing problems- n jobs on m machines, 2 jobs on n machines by Graphical method	12.5	87.5
58-62	TB2-9.1,9.2	**Integer programming**: **IV** Integer programming problems, Concept, Gomory's cutting plane method, Problems on Integer programming, Branch and Bound method, Additional problems on Integer programming, Zero-One Programming.	12.5	100

Syllabus for Internal Assessment Tests (IAT)*

IAT	Syllabu
IAT-	Class # 01 – 38
IAT-	Class # 39 – 62

Literature:

Book Type	Code	Author & Title	Publication information	
			Edition // Publisher	ISBN
Text Book	TB1	Operation research, P.K. Guptha and D S Hira,	Chand publications, New Delhi-2007	81-219-0281-9
Text Book	TB2	Operation research by Taha H A,	Pearson Education	978-81-317-8594-2
References	RB1	Operation research by S D Sharma	Kedar Nath Ram Nath house	978-81-259-3139-3
References	RB2	Operation research by Sreenivasa Reddy M	Interline Publishing	81-7296-039-5
References	RB3	Operation research Principles and practice by Ravindran Phillips solberg	Wiley publication	9971-51-302-1

CMR Institute of Technology, Bangalore		
Department(s): Mechanical Engineering		
Semester: 07	Section(s): A, B	
Non-Conventional Energy Sources	10ME754	Lectures/week: 05
Course Instructor(s): Dr. Harish Babu		
Course duration: AUG. 2017 – NOV. 2017		

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		Tar sands 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		Pyranometer, shading ring pyroheliometer, 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 sum, 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	RB2: 7.1 to 7.9	Photosynthesis, photosynthetic oxygen production, energy plantation,	11.5%	50%
22		bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants,		
23		transportation of bio-gas, problems involved with bio-gas production,		
24		application of bio-gas, application of bio-gas in engines, advantages.		
27		Properties of Hydrogen with respected to its utilization as a renewable form of energy,		

28	RB2: 8.1 to 8.8	sources of hydrogen, production of hydrogen, electrolysis of water, thermal decomposition of water,	11.5%	61.5%
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	15.5%	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
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 *G.D Rai*	Khanna Publishers, 2003.	
Text Book	TB2	Renewable Energy Sources and Conversion Technology by *N.K.Bansal, Manfred Kleeman & Michael Meliss*	Tata McGraw-Hill, 1990	
References	RB1	Renewable Energy Resources, *John W. Twidell and Tony Weir*	Taylor & Francis, 2006	
References	RB3	B H Khan, "Non Conventional Energy sources"	Tata McGraw Hill, 2nd Edition, 1996	

Course Plan

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

Lesson Plan

Class #	Chapter Title / Reference Literature	Topic	Percentage of portion covered	
			Reference	Cumulative
Introduction to ESA				
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%
Photo-elasticity				
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%
Two Dimensional Photo-elasticity				
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%
Three Dimensional Photo elasticity				

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%
Photoelastic (Birefringent) Coatings				
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%
Electrical Resistance Strain Gages				
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%
Strain Analysis Methods				
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%
Brittle Coatings				
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%
Moire Methods				

53-59	TB-2 12	Moire fringes produced by mechanical interference .Geometrical approach, isplacement field approach to Moire fringeanalysis ,0ut 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	**"Experimental Stress Analysis and Motion Measurement",** Richard C.Dove and Paul H.Adams	Second Edition Charles E. Merrill Books.	64-12874
Text Book	TB-2	**"Experimental Stress Analysis"** Dr. Sadhu Singh	Khanna Publishers	81-7409-182-3
Text Book	TB-3	**"Experimental Stress Analysis",** Dally and Riley, McGraw Hill	Second Edition McGRAW-HILL	0-07-Y66242-8
Text Book	TB-4	**"e-book on Experimental Stress Analysis"** K. Ramesh	Published by IIT Madras	978-81-904235-6-4