



National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	V

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total

ME 313	Experimental Stress Analysis	3	0	0	3	50	50	100	200	
Course Objectives	<p>To study the various experimental techniques involved for measuring displacements, stresses, strains in structural components</p> <p>To acquire the knowledge of application of NDT in stress analysis</p>	Course Outcomes	CO1	Knowledge of stress and strain measurements in loaded components using various types of extensometers. (Understanding)						
			CO2	Analyse the acquiring information's of electrical strain gauges & stress gauge for data analysis (Analysing)						
			CO3	Analyse the acquiring information's the usage of photo elastic techniques for stress measurement. (Analysing)						
			CO4	Application of coating for stress behaviour and strain analysis. (Applying)						
			CO5	Application of NDT in stress analysis (Applying)						

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	CO1	3	0	0	0	0	0	0	0	0	0	0	0	3	0
2	CO2	3	3	0	0	0	0	0	0	0	0	0	0	3	0
3	CO3	2	3	0	0	0	0	0	0	0	0	0	0	3	0
4	CO4	0	0	3	0	3	0	0	0	0	0	0	0	3	2
5	CO5	3	0	3	0	3	0	0	0	0	0	0	2	3	2

SYLLABUS

No.	Content	Hours	COs
I	EXTENSOMETERS AND DISPLACEMENT SENSORS Review of analysis of stress and strain – basic equations of elasticity. Principles of measurements, accuracy, sensitivity and range of measurements; mechanical, optical, acoustical and electrical extensometers and their uses; advantages and disadvantages; capacitance gauges, laser displacement sensors.	6	CO1
II	ELECTRICAL RESISTANCE STRAIN GAUGES Principle of operation of electrical strain gauges and requirements; types and their uses, materials for strain gauges. Calibration and temperature compensation, cross sensitivity, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, Rosette analysis, stress gauges, load cells, data acquisition, six component balance.	10	CO1 CO2
III	PHOTOELASTICITY Two-dimensional photo elasticity, photo elastic materials, stress optic law, Jones calculus, plane and circular polariscopes; interpretation of fringe pattern, calibration of photoelastic materials, compensation and separation techniques; introduction to three-dimensional photo elasticity.	10	CO1 CO3
IV	BRITTLE COATING AND MOIRE TECHNIQUES Relation between stresses in coating and specimen, use of failure theories in brittle coating, Moire method of strain analysis.	5	CO4
V	NON – DESTRUCTIVE TESTING Fundamentals of NDT, acoustic emission technique, radiography, thermography, ultrasonic, eddy current testing, fluorescent penetrant testing.	5	CO5
Total Hours		36	

Essential Readings

1. J.W. Dally and W.F. Riley, "Experimental Stress Analysis", Third Edition, McGraw Hill, New York, 1991.
2. L. S. Srinath and M. R. Raghavan, "Experimental Stress Analysis", Tata McGraw-Hill, 1984.

Supplementary Readings

1. A. W. Hendry, "Elements of Experimental Stress Analysis", Standard International Edition, Pergamon Press, 2013.
2. R.C. Dove and P. H. Adams, "Experimental stress analysis and motion measurement: theory, instruments and circuits, techniques", Prentice Hall, New Delhi, 1965.
3. A. Freddi, G. Olmi and L. Cristofolini, "Experimental Stress Analysis for Materials and Structures", Springer, 2015.
4. K. Ramesh, "Digital Photoelasticity", First Edition, Springer, 2000.