| S.No. | Topic | No. of Practicals |
|---|---|---|
| 3. | dissolved oxygen, hardness | 4 |
| 4. | Preparation of water quality map of watershed in GIS environment | 4 |
| 5. | Visit of water polluted site of nearby area | 1 |
| | **Total** | **16** |

## X. Suggested Reading


- Abbasi T and Abbasi SA. *Water Quality Indices.* Elsevier Publications, New York.
- Chin and David A. 2006. *Water Quality Engineering in Natural Systems.* Wiley – Interscience.
- Claude E. Boyd. *Water Quality an Introduction.* Springer Publications.
- Eaton AD, Clesceri LS, Rice EW and Greenburg AE (eds). 2005. *Standard Methods for the Examination of Water and Wastewater*. 21st edn. American Public Health Association, Washington, DC.
- Thomann RV and Mueller JA. 1987. *Principles of Surface Water Quality Modelling and Control*. Harper and Row Publishers.
- Wesley W, Wallender PE and Kenneth K. Tanji, Sc.D. *Agricultural Salinity Assessment and Management*. ASCE Press.


**I. Course Title : Experimental Stress Analysis**

**II. Course Code : CE 510**

**III. Credit Hours : 2+1**

## IV. Aim of the course

To acquaint the students with importance of analysis of stress, analysis of strain, stress-strain relationship under different constraint conditions in 2-D plane as well as 3-D plane.

## V. Theory

### Unit I

Strain and stress – strain relationship. Generalized Hook's Law. Strain Gauges-Mechanical, optical, electrical, acoustical and pneumatic etc and their use.

### Unit II

Different types of electrical resistance strain gauges. Semi-conductor strain gauges. Rosette analysis. Strain gauge circuits. Strain measurements at high temperatures.

### Unit III

Two dimensional and three dimensional photo-elastic method of strain analysis. Bifringent coatings and scattered light in photo-elasticity.

### Unit IV

Brittle coating methods. Moiré's method of strain analysis. Grid method of strain analysis. Photo elastic strain gauges.

## VI. Learning outcome

The students will be able to analyze stress, strain and their interrelationships when they are subjected to different end conditions in two dimensional and three dimensional planes and provide basis for analyses and calculations, including simplifications and assumptions made, when formulating for stress and strain.

## VII. Lecture Schedule

| S.No. | Topic | No. of Lectures |
|---|---|---|
| 1. | Strain and stress – strain relationship. Generalized Hook's Law | 3 |
| 2. | Strain Gauges- Mechanical, optical, electrical, acoustical and pneumatic etc. | 3 |
| 3. | Use of different strain gauges. Types of electrical strain gauges. | 3 |
| 4. | Semi-conductor gauges. Rosette analysis. Strain gauge circuits. | 32 |
| 5. | Strain measurements at high temperatures. | 2 |
| 6. | Two dimensional photo-elastic method of strain analysis. | 3 |
| 7. | Three dimensional photo-elastic method of strain analysis. | 3 |
| 8. | Bifringent coatings and scattered light in photo-elasticity. | 3 |
| 9. | Brittle coating methods | 3 |
| 10. | Moir's method of strain analysis. | 2 |
| 11. | Grid method of strain analysis. Photo elastic strain gauges. | 2 |
| | **Total** | **32** |

## VIII. List of Practicals

| S.No. | Topic | No. of Practicals |
|---|---|---|
| 1. | Cementing of an electrical resistance strain gage on a structural member | 1 |
| 2. | To find the gage factor for a resistance type strain gage. | 1 |
| 3. | To measure strain at centre of bream when loaded at greater points by making use of two strain gages one at top surface and 2nd at bottom both along longitudinal direction and fixing both in first and second arm of the bridge. | 3 |
| 4. | To measure the modulus of elasticity of the beam making use of four strain gages, two on top and two on bottom, one on longitudinal and one in transversal direction on each face of the beam. | 3 |
| 5. | Deter mine the tension produced in a circular shaft by using strain gages cemented perpendicular to each other. | 1 |
| 6. | Determine the bending moment produced in a circular shaft by using a rectangular shaft. | 1 |
| 7. | To align the circular polariscope. | 1 |
| 8. | Study the plane polariscope and circular polariscope with different light field arrangements. | 1 |
| 9. | Study of Moiré fringe apparatus and its applications in analysis of structures. | 2 |
| 10. | Calibrate the photoelastic material by use of rectangular beam under pure bending. | 2 |
| | **Total** | **16** |

## IX. Suggested Reading


- Srinath LS, Raghavan MR, Lingaiah K, Gargesha G, Pant B and Ramachandra K. Experimental Stress Analysis, McGraw-Hill.
- Dally JW and Riley WF. *Experimental Stress Analysis*, McGraw-Hill.
- Singh S. *Experimental Stress Analysis*, Khanna Publishers.