



Reg. No. :

Name :

First Semester M.Tech. Degree Examination, March 2014
(2013 Scheme)
CIVIL ENGINEERING
Streams : Structural Engineering, Structural Engineering and
Construction Management
CSC 1004 : Experimental Methods and Instrumentation

Time : 3 Hours

Max. Marks : 60

Instructions : Answer **any two full** questions from **each** Module.

All questions carry **equal** marks.

Assume **suitable** data **wherever** necessary.

MODULE – 1

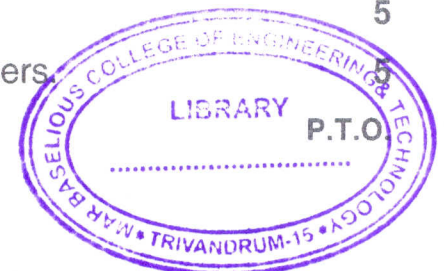
(2×10)

1. a) Derive an expression for the sensitivity of electric resistance strain gauge. 5
b) Explain the principle and working of a vibrating wire strain gauge. 5
2. The following observations are made with a delta gauge bonded to steel with gauge aligned along x-axis : $\epsilon_0 = 220 \mu\text{mm/mm}$; $\epsilon_{60} = 100 \mu\text{mm/mm}$; $\epsilon_{120} = 250 \mu\text{mm/mm}$. Determine the principal strains, principal stresses and principal angles ($E = 200000 \text{ N/mm}^2$ and $\nu = 0.29$).
3. a) Explain the arrangement of strain gauges in quarter, half and full bridges. Derive sensitivity expressions of bridges. Discuss the temperature compensating features of these gauges. 5
b) Explain the construction of any two types of force balance. 5

MODULE – 2

(2×10)

4. a) An accelerometer of natural frequency 20 kHz and a vibration pick up of natural frequency 8 Hz and damping ratio 0.67 are mounted on a vibration shaker table. When the table is vibrated at 12 Hz the vibration pick up showed relative amplitude of 3 mm and the accelerometer output was 9 mv. Calculate accelerometer sensitivity. 5
b) Explain the calibration technique used for accelerometers. 5





5. a) Derive the expression for intensity of light passing through a stressed model in a plane polariscope. Discuss the formation of isoclinic and isochromatic fringes. 5
- b) State and explain Maxwell's Law. What do you understand by fringe value ? 5
6. Write short notes on :
- a) Moire fringe method. 3
- b) Photoelastic model materials. 3
- c) Shear difference method. 4

MODULE – 3

(2x10)

7. Explain the principle of ultrasonic pulse velocity method for quality testing concrete. Discuss the working of a typical ultrasonic pulse velocity tester. Explain the method of determining depth of crack using ultrasonic pulse.
8. Explain the methods employed for measuring high frequency response. Explain the working and use of Cathode ray oscilloscope.
9. Write short notes on :
- a) Detection of embedded reinforcements. 3
- b) Errors in measurements. 3
- c) Core cutting method for testing concrete. 4
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