Question Paper Code: 61063


Second Semester

Structural Engineering

ST 7202 — EXPERIMENTAL TECHNIQUES AND INSTRUMENTATION

(Regulations 2013)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A — (10 x 2 = 20 marks)

1. Define Strain Gauge and name any two uses?

2. List down the different types of Pressure Gauges.

3. Differentiate Seismogram and Seismograph.

4. State the characteristics of Structural Vibrations.

5. Explain Controlled Blasting.

6. Mention the uses of Brittle Coating.

7. What do you meant by holography?

8. State the principle behind Rebound Hammer.

9. State the laws of similitude.

10. What are the limitations of model study?
PART B — (5 x 13 = 65 marks)

11. (a) The following readings of strain were obtained on a rectangular strain rosette mounted on aluminium for which \( E = 70 \text{ GPA}, \ \gamma = 0.32, \ \varepsilon_a = 285 \times 10^{-6}, \ \varepsilon_b = 65 \times 10^{-6}, \ \varepsilon_c = 120 \times 10^{-6}. \) Determine the principal strain, principal strain direction, principal stresses and maximum shear stress. (13)

Or

(b) (i) List the various types of strain gauges. (6)
(ii) Explain with sketches the construction and working of Huggenberg extensometer. (7)

12. (a) Draw the circuit diagram of linear variable differential transformer and explain its working principal and applications. (13)

Or

(b) Explain in detail about the structure and working principal of a wind tunnel with a neat sketch. (13)

13. (a) Write a detailed note on diagnosis of distress in structures and structural health monitoring. (13)

Or

(b) With a help of case study explain in detail about controlled blasting for demolition of structures. (13)

14. (a) Discuss in detail about Ultrasonic testing principles and its applications. (13)

Or

(b) Explain with sketches the working of rebound hammer. (13)

15. (a) A rectangular RC. beam of cross section 250 mm x 400 mm with simply supported span of 3m is to be tested with a central concentrated load of 10 kN. The maximum deflection observed was 8 mm. (\( E = 36000 \text{ N/mm}^2, \) Poisson’s ratio 0.16). A 1: 5 scale model using plaster of paris is to be made. (\( E = 10 \times 10^{-3} \text{ N/mm}^2, \) density 1.10, Poisson’s ratio 0.215). Find the different scale ratios and the corresponding load to be applied and its deflection. (13)

Or

(b) Write short notes on the following: (5)
(i) Model materials
(ii) Indirect model study
(iii) Usage of influence lines. (5)
(iv) (3)
PART C — (1 × 15 = 15 marks)

16. (a) State the Application of Model analysis in Structural members in detail. (15)

Or

(b) Analyse the compensation methods in photo elasticity and explain in detail two methods of compensation in polariscope? (15)