



M.E DEGREE EXAMINATIONS: JUNE 2016

(Regulation 2015)

Second Semester

STRUCTURAL ENGINEERING

P15SETE21: Experimental Methods and Model Analysis

COURSE OUTCOMES

CO1: Demonstrate the various force and strain measuring equipments.

CO2: Choose various data indicating and recording instruments.

CO3: Perform model analysis

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Consider the sequence of testing of specimens. CO1 [K₂]
 1. Calibration of load cells
 2. Ultimate load is noted
 3. Positioning of specimen in test set up
 4. Breaking load is noted

The correct sequence is

a) 3-1-4-2	b) 4-2-2-1
c) 2-4-1-3	d) 1-3-2-4

2. The strain gauge which uses the combined lever, rack and pinion magnification system is CO1 [K₂]

a) Tinius Olsen gauge	b) Capp's divider
c) Porter-Lipp gauge	d) Whittmore gauge

3. The insulation material used in the lead wires under cryogenic temperatures is, CO2 [K₂]

a) PVC	b) Nylon
c) Rubber	d) Polyethylene

4. Match list I with list II and select the correct answer using the codes given below. CO1 [K₃]

List I	List II
A. Balanced bridge	i. Potentiometer circuit
B. Strain sensitivity	ii. $R_1 R_3 = R_2 R_4$
C. Potentiometer recorder	iii. Strip chart
D. Dynamic strain	iv. $(\Delta R/R)/\epsilon$

- | | A | B | C | D | | |
|----|-----|----|-----|----|--|--|
| a) | ii | i | iii | iv | | |
| b) | iii | iv | ii | i | | |
| c) | ii | iv | iii | i | | |
| d) | iii | i | ii | iv | | |
-
5. The sensitivity of the Moire's fringes is given by CO2 [K₂]
- | | |
|-------------------------|--------------------------|
| a) dp/p | b) $-d\epsilon/\epsilon$ |
| c) $d\epsilon/\epsilon$ | d) $d\sigma/\sigma$ |
6. When the strain field is unknown, the rosette recommended for use is CO2 [K₂]
- | | |
|------------------------|-------------------|
| a) T-Delta rosette | b) Delta rosette |
| c) Rectangular rosette | d) Square rosette |
7. Assertion (A): The lens less photography is known as holography CO2 [K₂]
Reason (R): The most common and suitable light source for holography is gas laser.
- | | |
|--|--|
| a) Both A and R are individually true and R is the correct explanation of A. | b) Both A and R are individually true and R is not the correct explanation of A. |
| c) A is true but R is false. | d) A is false but R is true. |
8. Radiographic inspection is used to detect CO2 [K₁]
- | | |
|-------------------|-----------|
| a) Internal flaws | b) Rebars |
| c) External flaws | d) Cover |
9. Consider the following statements. CO3 [K₂]
1. The crossed – parallel setup is the standard setup of the circular polariscope.
 2. Light of a single wave length is called monochromatic light.
 3. At isotropic points, fringe order is unity.
 4. A photo elastic material should be free from residual stresses.
- Which of these statements are correct?
- | | |
|---------|--------|
| a) 1, 3 | b) 3,4 |
| c) 2, 4 | d) 2,3 |
10. The large scale structures are subjected to model testing when CO3 [K₂]
- | | |
|----------------|----------------|
| a) $SL \leq 4$ | b) $SL < 4$ |
| c) $SL = 4$ | d) $SL \geq 4$ |

PART B (10 x 2 = 20 Marks)

11. What are the basic requirements for measurement? CO1 [K₂]
12. List the advantages of Porter Lipp strain gauge. CO1 [K₂]
13. What is a transducer? CO2 [K₂]

- | | | |
|--|-----|-------------------|
| 14. List the effects of lead wires on strain measurements. | CO2 | [K ₂] |
| 15. What is a strain rosette? | CO2 | [K ₂] |
| 16. List the equipments for loading. | CO2 | [K ₂] |
| 17. List the limitations of NDT. | CO2 | [K ₂] |
| 18. Define holography. | CO2 | [K ₂] |
| 19. What is geometric similarity? | CO3 | [K ₂] |
| 20. State stress optic law. | CO5 | [K ₂] |

PART C (6 x 5 = 30 Marks)

- | | | |
|---|-----|-------------------|
| 21. Why Foil type of gauges is preferred over the wire type gauges? | CO1 | [K ₂] |
| 22. Sketch and explain the working of Wheatstone bridge circuit. | CO2 | [K ₂] |
| 23. Explain seismograph with a neat sketch. | CO2 | [K ₂] |
| 24. Explain load testing on bridges. | CO3 | [K ₂] |
| 25. Explain testing of large scale structures. | CO2 | [K ₂] |
| 26. Explain the use of wind tunnel in structural analysis. | CO3 | [K ₂] |

**Answer any FOUR Questions
PART D (4 x 10 = 40 Marks)**

- | | | |
|--|-----|-------------------|
| 27. Explain the following: (i) Proving rings and (ii) Electronic load cells. | CO1 | [K ₂] |
| 28. Explain the types of switching systems with neat sketches. | CO2 | [K ₃] |
| 29. Explain Moire's technique with a neat sketch. | CO2 | [K ₂] |
| 30. Explain any two non-destructive testing techniques. | CO2 | [K ₂] |
| 31. Explain isoclinics and isochromatics in detail. | CO3 | [K ₃] |
