Seat No.

Total No. of Pages : 2

MAR_APR 2026 SUMMER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Earthquake Engineering

Sub. Code: 67559/83733/84013

Day and Date: Friday ,15-05-2026 **Total Marks: 70**

Time: 10:30 AM To 01:00 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Draw neat labelled diagrams wherever necessary**
4. **Figures to the right indicate full marks**
5. **Use Sketches/Diagrams wherever necessary**

Q1) Attempt any one: **[7]**

a. Explain the elastic rebound theory with suitable diagrams. **[7]**

b. Define intensity and magnitude of an earthquake. How are they measured? **[7]**

Q2) Attempt any two: **[14]**

a. Derive the equation of motion for forced vibration of a damped SDOF system. **[7]**

b. Explain Duhamel's integral and its application in earthquake engineering. **[7]**

c. A mass of 10 kg is attached to a spring with stiffness 2000 N/m and a damper with damping coefficient 50 Ns/m. Find the natural frequency, damping ratio, and comment on the type of damping. **[7]**

Q3) A 4-storey reinforced concrete building (plan size 14m × 18m) is located in Zone III on medium soil. **[14]**

Floor-to-floor height = 3.5m.

Other data:

- Slab thickness = 150 mm
- Beam size = 300 mm × 450 mm
- Column size = 300 mm × 450 mm
- Wall thickness = 200 mm
- Live load = 5 kN/m^2
- Concrete density = 25 kN/m^3, Masonry density = 20 kN/m^3
- Response Reduction Factor (R) = 5
- Damping = 5%
- Importance Factor (I) = 1.0

Find: Seismic forces on each floor using Seismic Coefficient Method.

Q4) Attempt all questions: **[12]**

45937

a. Explain different structural systems used in earthquake-resistant buildings. **[6]**

b. State and explain the design philosophy of earthquake-resistant buildings. **[6]**

Q5) Attempt all questions: **[12]**

a. Explain the procedure for retrofitting and strengthening of a damaged masonry wall. **[6]**

b. What are the key provisions of IS 4326:1993 for openings in masonry walls? Explain their importance with sketches. **[6]**

Q6) Attempt all: **[11]**

a. Explain Tuned Mass Dampers (TMD) with a neat sketch. **[6]**

b. Compare elastomeric and sliding base isolators. **[5]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (101) Bachelor of Engineering (84013) Earthquake Engineering Part 4 SEM 7
2] (101) Bachelor of Engineering (67559) Earthquake Engineering Part 4 SEM 7
3] (1154) B.Tech. CBCS (83733) Earthquake Engineering Part 4 SEM 7

45897