



M.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

STRUCTURAL ENGINEERING

P14SET204: Aseismic Design of Structures

(IS 1893, 4326, 13920, 13827 and 13828 are permitted)

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): The epicenters of 99% earthquakes are distributed along narrow zones of inter-plate seismic activity. The reminder of earth is considered to be aseismic [K₂]
Reason (R): No region of the earth can be regarded as completely earthquake free
 - a) A is true and R is false
 - b) A is false and R is true
 - c) A is true and R is true
 - d) A and R are true. R is reason for A
2. Pick the odd one about types of damping [K₃]
 - a) Structural Damping
 - b) Elemental Damping
 - c) Viscous Damping
 - d) Negative Damping
3. Following is one of the method for obtaining base shear from earthquake force [K₂]
 - a) Response spectrum analysis
 - b) Lateral load analysis
 - c) Dynamic analysis
 - d) Elastic time history analysis
4. Matching type item with multiple choice code [K₁]

List I		List II	
A. Stodola method		i. Seismometers	
B. Velocity pickup		ii. Frequencies above 33 Hz	
C. Substructure approach		iii. Frequency determination	
D. Zero period acceleration		iv. Soil structure interaction	

- | | A | B | C | D |
|----|-----|-----|-----|-----|
| a) | i | iv | iii | iii |
| b) | ii | ii | i | iv |
| c) | iii | i | iv | ii |
| d) | iv | iii | ii | I |

PART B (10 x 2 = 20 Marks)

11. Define Reid's elastic rebound theory [K₂]
12. What is Richter magnitude [K₂]
13. List the advantages of response spectrum theory [K₂]
14. Define mode shape [K₂]
15. Define global ductility [K₂]
16. Relate energy absorption in seismic design concept [K₂]
17. Where is the coupled shear wall provided in a building? [K₂]
18. Name the types of shear walls. [K₂]
19. Define dynamic oscillators and how it acts in a building? Which type of system is it? [K₂]
20. List the Base isolation devices. [K₂]

PART C (10 x 5 = 50 Marks)

21. Discuss about the masonry building performance in Nepal - Gorkha earthquake 2015? [K₃]
22. Compare the seismograph from accelerographs [K₃]
23. If a five stories building are excited to a multiple support means what will the causes occur in it? What will be the remedies that will need in it? [K₃]
24. Write down step by step procedure for the response spectra method? [K₃]
25. Calculate the base shear acting on three storey school building having following data [K₃]
 - i. Thickness of wall – 230mm
 - ii. Thickness of slab – 230mm (all floors)
 - iii. Size of columns – 300mm x 300mm (all columns)
 - iv. Size of beam – 230mm x 230mm (all beams)
 - v. Live load – 2.5 kN/m²
 - vi. Location – Coimbatore
 - vii. Soil type – rock
 - viii. Floor height – 3m (all floor)
 - ix. Spacing of 3 columns is 5m in length direction for a plan of 10m and spacing of 3 columns is 4m in breadth direction of 8m
26. Describe in detail about seismic design of three-storeyed masonry buildings with neat diagram. [K₃]
27. Illustrate in brief about strong column weak beam concept. [K₂]
28. Explain in brief about the ductile detailing of a multistory frame for earthquakes [K₃]
29. Write a brief history about the earthquake protective system [K₂]
30. What are the advantages for lateral load design using software? Which software holds better result? Compare the earthquake design of structures using various software in India? [K₃]

PART D (2 x 10 = 20 Marks)

31. Find the mode shapes for a frame having three stories. With $m_1 = 2\text{kN}$, $k_1 = 1800\text{ kN/m}$, $m_2 = 1.5\text{kN}$, $k_2 = 1200\text{ kN/m}$ and $m_3 = 1\text{kN}$, $k_3 = 600\text{ kN/m}$ from bottom to top. [K₃]

32. Design a shear wall of length 4.16m with thickness of 250 mm subjected to following forces [K₄]

	Axial Load (kN)	Bending Moment (kNm)	Shear (kN)
Dead Load + Live Load	1950	600	20
Seismic Load	250	4800	700
