

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: MTECH/PRE PHD
BRANCH: CIVIL

SEMESTER : II/NA
SESSION : SP/2023

SUBJECT: CE508 EARTHQUAKE ENGINEERING

TIME: 3 Hours

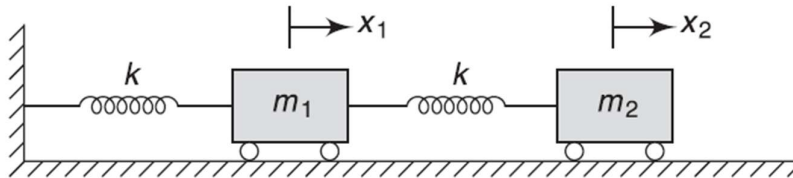
FULL MARKS: 50

INSTRUCTIONS:

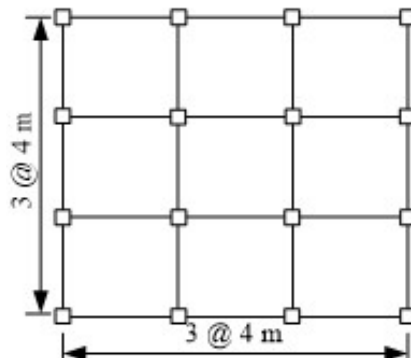
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
 6. Use of Indian standard code IS: 1893 (Part-1):2016 is allowed in the examination hall.
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|--------|---|-----|-----------|----------|
| Q.1(a) | Write a short note on the followings:
a) Different plate boundaries
b) Seismic waves | [5] | CO
CO1 | BL
K1 |
| Q.1(b) | Distinguish between the following:
a) Body waves and surface waves
b) Rayleigh waves and love waves | [5] | CO1 | K2 |

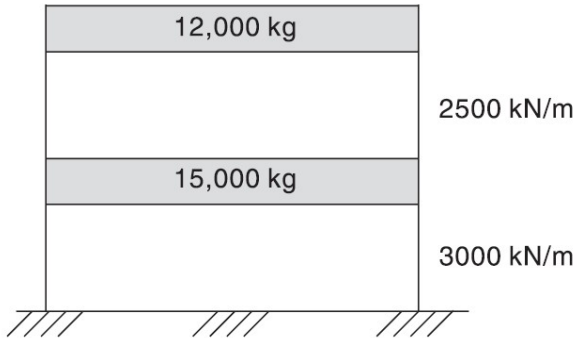
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|--------|---|-----|-----|----|
| Q.2(a) | Determine the natural frequency and mode shapes for different modes for the system shown in Figure ($m_1 = m_2 = m$). | [5] | CO2 | K3 |
|--------|---|-----|-----|----|



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|--------|--|-----|-----|----|
| Q.2(b) | A vibrating system consisting of a mass of 50 kg and a spring of stiffness 4×10^4 N/m is viscously damped. The ratio of two consecutive amplitudes is 20:18. Determine the natural frequency of undamped system. Also determine the damping ratio and damped natural frequency. | [5] | CO2 | K3 |
| Q.3(a) | An 8-storey RCC concrete school building (having Special Moment Resisting Frame with masonry infill) has plan dimensions as shown in the given figure. The storey height is 3.3 m. The DL per unit area of the floor is 4 kN/m^2 . The intensity of live load on each floor is 3 kN/m^2 and on the roof is 1.5 kN/m^2 . The soil below the foundation is medium stiff and the building is located in Shillong. Determine the design base shear for the building as per the equivalent static method of IS-1893 (Part-1): 2016. | [5] | CO3 | K3 |



- Q.3(b) Determine the seismic forces and shears at different floor levels of the two storey structure (shown in the figure) using the response spectrum method of IS-1893 (Part-1): 2016 [5] CO3 K4



- Q.4(a) Describe the effect of soil-structure interaction on the seismic response of structures. [5] CO4 K2
- Q.4(b) Describe the 'Direct Method' and 'Sub-structuring Method' of solving soil-structure interaction problems [5] CO4 K2
- Q.5(a) Write a short note on different base isolation systems [5] CO5 K2
- Q.5(b) Write a short note on different passive energy dissipative systems [5] CO5 K2

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