



SF-8324

B. E. - III (Sem. VI) (Civil) Examination

May / June - 2011

Earthquake Engineering

(New Scheme)

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

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Name of the Examination :	<input type="text"/>
<input type="checkbox"/> B. E. - 3 (SEM. 6) (CIVIL)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> EARTHQUAKE ENGINEERING (NEW)	<input type="text"/>
Subject Code No. : <input type="text"/> 8 <input type="text"/> 3 <input type="text"/> 2 <input type="text"/> 4	<input type="text"/>
Section No. (1, 2,.....) : <input type="text"/> 1&2	<input type="text"/>
	Student's Signature

- (2) Use of IS 456 and IS 1893 is permitted.
- (3) Assume suitable data if necessary and mention them clearly.
- (4) Neatly drawn pencil sketches will earn special credits.

SECTION - I

- 1 Plan of a five-storey office building is located in seismic zone IV. The type of soil is medium stiff and it is proposed to design the building with a SMRF. Dead load including self weight of slab, finishes, partition etc. can be assumed as 5 kN/m² and live load a 4 kN/m² on each floor and as 1.5 kN/m² on the roof. Consider storey height 3.5 m. Dimension of frame, X-direction:3 bays a=8.5 m, b=3m, c=8.5m and Y-direction: 4 bays @ 8m. 14
- 2 (a) Attempt any three from following : 12
 - (i) Explain in brief 'Response spectrum' and discuss its significance in analysis of structure.
 - (ii) Earthquake Proof and Earthquake Resistant Design.
 - (iii) What is Inertia Forces ? Explain with sketch how they are transferred to the soil.
 - (iv) What is base isolation ? Explain base isolation system.

- (b) Using portal method, analysis the building frame subjected to horizontal forces (due to wind) as shown in Fig. 1 Draw AF, SF and BM diagrams. 14

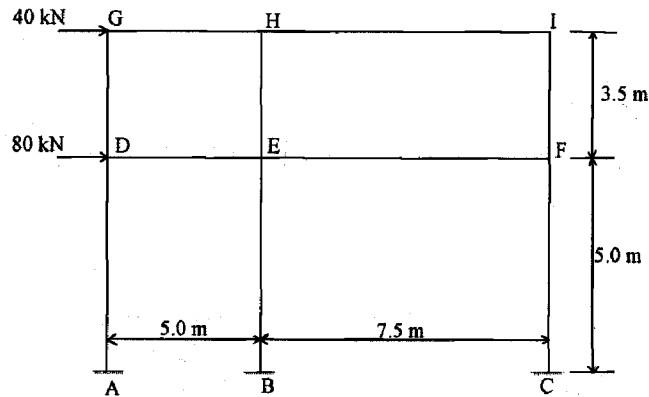
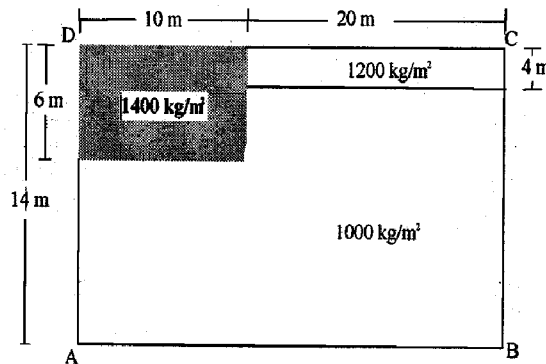


Fig. 1

OR

- (b) (i) Distinguish : torsionally coupled and uncoupled system. 4
- (ii) For the building shown in fig. locate the centre of mass. The building has non-uniform distribution of mass as shown in the fig.2. 10



Plan of building

Fig. 2

- 3 Discuss detailing of column with respect to IS 13920 - 1993. Draw neat sketch if required. 10

OR

- 3 Describe the importance of stirrups in RCC beams and its requirement as per IS 13920-1993. 10

SECTION - II

- 4 (a) Derive the equation of motion and find natural frequency of the Fig.3. Assume horizontal girder to be infinitely rigid and neglect the mass of column. $M=20000$ kg $EI=70 \times 10^{12}$ N.mm². 10

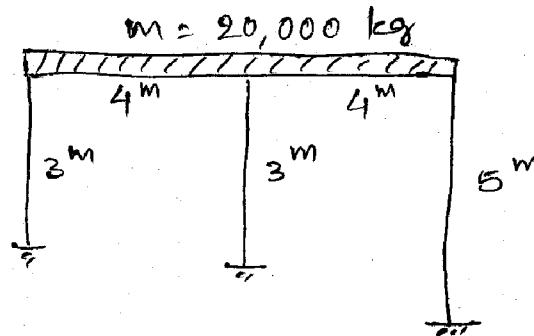


Fig. 3

- (b) Find the natural frequency of the system shown in Fig.4. 10

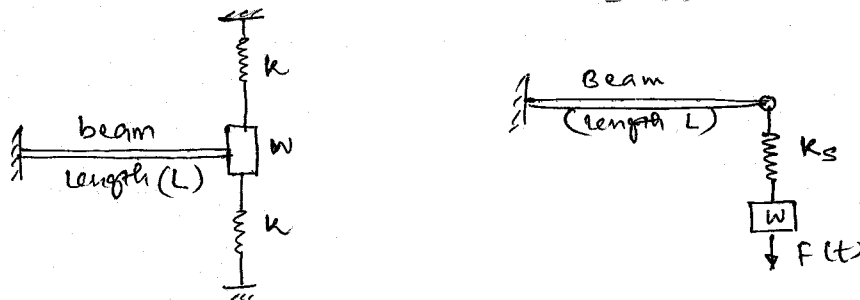


Fig. 4

- 5 (a) Derive the equation of motion for damped forced SDOF system and explain it. 10
- (b) Explain the waves initiated during earthquake. 8

OR

- 5 (a) Derive the equation of motion for undamped forced SDOF system and explain it. 10
- (b) How mathematical model is useful to understand the behaviour of structure during earthquake. 8

6 Attempt any two :

12

- (a) Define earthquake and classify them based on responsible for it.
 - (b) Explain how vertical bands and horizontal bands are useful in masonry structures with sketches.
 - (c) Explain measuring magnitude of an earthquake.
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