

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
END SEMESTER EXAMINATION-2015
M.Tech (SE) II Semester

COURSE CODE:12M1WCE213

MAX. MARKS: 45

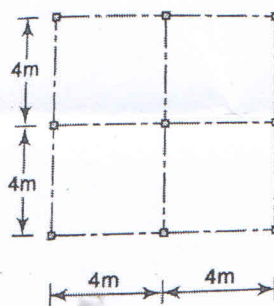
COURSE NAME: Earthquake Resistant Design of Structures

MAX. TIME: 3 HRS

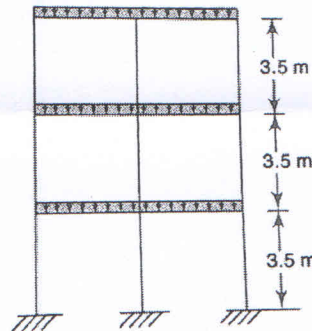
COURSE CREDITS: 3

Note: All questions are compulsory. Marks are indicated against questions. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. What are the tuned mass damper and active control systems? Discuss their working in earthquake protection by using a schematic of both, write governing dynamic equations too. (6)
2. Discuss the provisions for longitudinal, transverse and special confining reinforcement for ductile detailing of columns as per IS 13920. Support your answer with suitable sketches. (6)
3. Why Nepal is prone to such massive earthquakes ? Discuss the seismicity of Nepal to justify your answer. (4)
4. Discuss various types and behavior of elastomeric bearing system and sliding bearing system. How does these system provide earthquake protection to the buildings. (6)
5. The plan and elevation of a three storey RCC school building is shown in Fig below. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building as a Special moment resisting frame. The intensity of dead load is 10 kN/m^2 and floors are subjected to an imposed load of 3 kN/m^2 . Determine the design seismic loads as per static analysis and distribute them to all floor levels. (5)



(a) Plan



(b) Elevation

6. Determine the design seismic forces for the building data given in above problem using response spectrum dynamic analysis. Show the distribution of lateral forces with building height. The free vibration properties are given in table below. Compare the static and dynamic base shear and give your comments. (12)

Floor	Natural Periods in (s)	Mode 1	Mode 2	Mode 3
		0.0647	0.023	0.016
Mode shapes				
3 rd floor		1.00	1.00	1.00
2 nd floor		0.802	-0.555	-2.247
1 st floor		0.445	-1.246	1.8018

7. Discuss the following provisions, in detail, which are required for a brick masonry construction to make it earthquake resistant. (i) Provision of horizontal bands and detailing at corner and (ii) use of vertical reinforcement and detailing at opening. (6)