Name: **Enrolment No:**	

UPES

End Semester Examination, May 2023

Course: Structures in Disaster Prone Areas & Rehabilitation **Semester: II**

Program: M.Tech. Structural Engineering **Time : 03 hrs.**

Course Code: CIVL 7021 **Max. Marks: 100**

Instructions: Assume necessary data if required.

SECTION A

S. No.		Marks	CO
Q 1	Draw a schematic diagram for the classification of retrofitting.	**4**	**CO1**
Q 2	Draw the detailing for column jacketing.	**4**	**CO1**
Q 3	Discuss the disadvantages of base isolation.	**4**	**CO1**
Q 4	Draw detailing of beam-column joint as per IS 13920.	**4**	**CO1**
Q 5	Write modern techniques of retrofit after a natural hazard like an earthquake.	**4**	**CO3**
	SECTION B		
Q 6	Explain Briefly three stages of retrofitting. i. Pre-Construction stage ii. Construction stage iii. Post-construction stage	**10**	**CO1**
Q 7	Explain Various types of Jacketing methods that can be used for retrofitting.	**10**	**CO3**
Q 8	With help of neat sketches, explain how the pullout helps to assess the distress of the structure. OR With help of neat sketches, explain how the Windsor probe test helps to assess the distress of the structure.	**10**	**CO2**
Q 9	Discuss methods of retrofitting for concrete structures.	**10**	**CO3**
Q 10	Case Study: The concrete test frames were built at full scale outside the Structural Engineering and Materials Laboratory on Georgia Tech campus (Figure 1). Four identical frames and two strong collapse	**20**	**CO2**

prevention frames were constructed. The total of six individual frames are separate from each, with a gap between every two neighboring frames. Figure 2 shows the main dimensions of the test frame, which consists of two bays and two stories and was meant to be representative of low-rise reinforced concrete office buildings in the central and eastern United States built in the 1950s-1970s, when non-ductile reinforced concrete frames were built before modern seismic code was used. Frame 1 is an as-built bare frame as the reference structure, while different seismic retrofit measures are applied to the other three frames for seismic research.

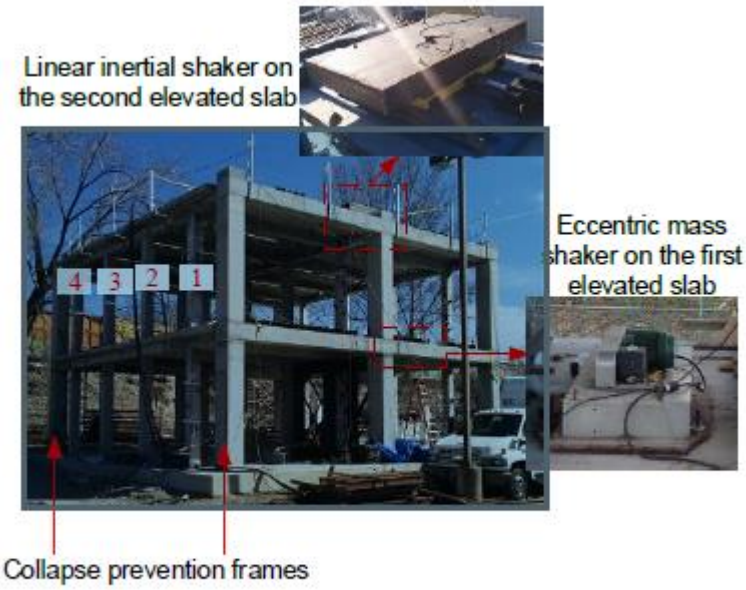

Figure 1. Photo of test frames and two shakers on Frame 1 under test

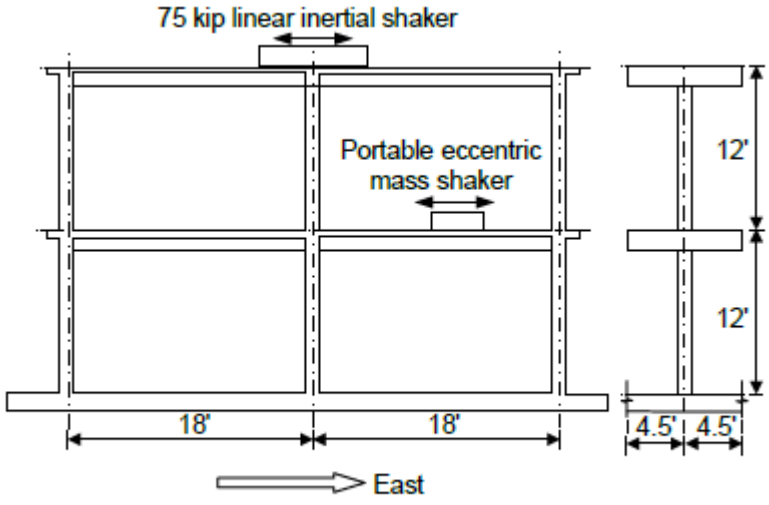

Figure 2. Elevation and side-view drawing

	Explain how the structural health monitoring system works using this case study.		
Q 11	Explain briefly the cause of distress in structural members. OR Discuss preventive measures of deterioration in concrete Structures	**20**	**CO4**