PRN:		Course Code:	CET 2702

Final Year B. Tech End Semester Examination Winter 2023

Earthquake Engineering

Day and Date: Thursday, 30/11/2023 Max Marks: **100**

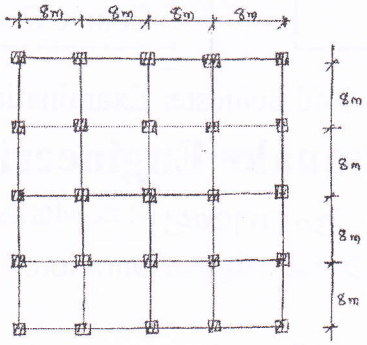
Time: 2.00 to 5.00 PM Duration: **03** hrs

Instructions: All questions are compulsory.
IS: 1893:2016 and IS 13920 are allowed

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	What are the direct and indirect consequences of earthquake.?	08	L1	CO 1
	b)	Explain the strong motion characteristics of earthquake.	08	L1	CO 1
		OR			
	b)	Explain how subduction zones form and what occurs at such a plate boundary.	08	L1	CO 1
Q.2		**Attempt the following**			
	a)	Derive the equation of motion and its solution for free undamped vibration system.	08	L2	CO 2
	b)	An SDOF system of mass 'm' and stiffness 'k' is to be found to vibrate with a natural frequency of 12 Hz. If the stiffness is decreased by 1000 N/m , the natural frequency is altered by 50%. Determine mass and stiffness for the original system.	08	L2	CO 2
		OR			
	b)	Draw the response graph of undamped free vibration SDOF system. Hence explain initial displacement, initial velocity, period and amplitude.	08	L2	CO 2
Q.3		**Attempt any two from the following**			
	a)	What do you understand by Dynamic Magnification factors?	08	L2	CO 2
	b)	A simply supported beam of negligible mass spanning 6 m supports a Machine of 60 kN at center with an unbalanced rotor applying a vertical Force of 50 sin 5t kN. The damping force is 0.3 kN - s/m & Flexural Rigidity of beam is 30000 kN-m^2. Determine i) maximum amplitude of vibration ii) Amplitude of vibration at resonance	08	L2	CO 2
	c)	Derive the displacement transmissibility ratio from equation of motion	08	L2	CO 2
Q.4		**Attempt any One from the following**			
	a)	A four storied square RC framed building shown in Fig. 1 with live load 3 kN/m^2 is to be constructed in Delhi. Work out seismic forces on the structure by seismic coefficient method using IS 1893. All beams and columns size 230mm x 400 mm. Thickness of roof and floor slab 125 mm thick. Wall is of 230 mm thick all around. Height of each floor 3.5m. Density of concrete 25 kN/m^3	16	L3	CO 3

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	b)	A 3-story building is to be constructed in the area of seismic zone II having medium soil. The dimension of the building is 10m × 20m. The height of each story is 3.2m. The live and dead load on each floor is 3.0 kN/m^2 and 7 kN/m^2, respectively. The live and dead load on the roof is 2.0 kN/m^2 and 4.0 kN /m^2, respectively. Take importance factor as 1 and response reduction factor as 3. Determine the seismic shear force in each story and overturning moment at the base as per IS: 1893 (Part 1)-2016.	16	L3	CO 3
Q.5		**Attempt any Two of the following**			
	a)	Define shear wall. Describe the structural behavior of shear wall under seismic loading.	09	L4	CO 4
	b)	Explain the necessity of reinforcement in masonry buildings and its important locations.	09	L5	CO 4
	c)	Write a short note on 'effect of discontinuity in load path'.	09	L4	CO 4
Q.6		**Attempt any Two of the following**			
	a)	What is combined bearing? What are the advantages of combination bearings?	09	L3	CO 4
	b)	Explain the phenomenon of "Soil liquefaction'. In what type of soil does it occur. How to avoid the failure due to soil liquefaction.	09	L3	CO 4
	c)	Explain in details concept of friction Pendulum Bearings?	09	L3	CO 4

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