23421

M. Tech 2nd Sem. (Civil Engg.)

(Specialisation in Structural Design)

Examination – May, 2018

STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING

Paper : MTSD-201

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks. Assume any data if missing.

1. Explain D' Alembrt's principle. Also dervie the expression for the Undamped single degee of freedom with the help of the free body diagrams.   20

2. Derive the expression for numerical evaluation of Duhamel's integral-undamped system.   20

3. Derive the expression for the Damped single degree of freedom with the help of the free body diagrams.   20

4. A four storey steel frame building as shown in Fig. is situated at Gurgaon. The height of the building is 28 m (7m each). The dead and live load is lumped at respective floor. The soil below the foundation is hard rock. Take $1 = 1.5$, determine the total base shear as per ISI893:2002 and distribute it along the height of the building. 20

| $M_4 = 650kN$ |
| $M_3 = 450kN$ |
| $M_2 = 550kN$ |
| $M_1 = 400kN$ |

Fixed base.

5. By Rayleigh's method, determine the natural frequency of the two storey frame shown in figure. Assume the horizontal members are very rigid compared to the columns of the frame. 20

$M_2 = 80 Ib \sec 2 / in$

$k_2 = 44500 \, Ib / in \quad -- y^2$

$M_1 = 95 \, Ib \sec 2 / in$

$k_1 = 44500 Ib / in \quad - y_1$

6. How damping coefficient of a system is found out practically ? Explain Logarithmic decrement in detail.20

7. Explain Rayleigh principle of determining the fundamental frequency with the help of an example.20

8. Explain the nature of seismic loads like earthquake, wind and blast loads. What is their method of discretization ? 20