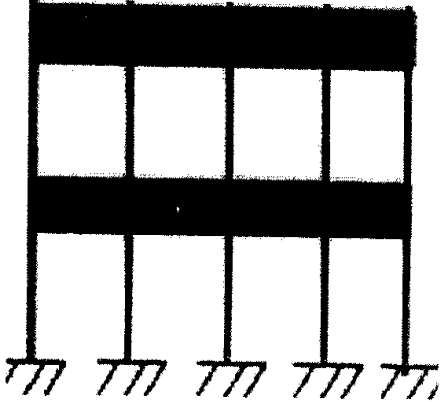# B.E. Civil Engineering - Fourth Year - Second Semester-2018
Structural Dynamics
PART-I

Time: Three Hours   Full Marks 100

Use a separate Answer-Script for each part

[IS1893 is allowed]

No. of questions	Part I	Marks (2X20=40)
1	Consider a four bay two storey R.C. framed building as shown in figure. The floor is rigid. The mass at the first floor and at roof are 100 kN/m2 and 75 kN/m2 respectively. Area of floor is 50 m^2 The column size at ground floor is 400X400 and at first floor is 350X350. Floor to floor height is 3m in each floor. The building is located at Delhi (zone IV). Determine the storey stiffness, frequencies and mode shapes. Compute also the storey shears and floor forces. Assume M25 grade of concrete.	20
2 (a)	Derive the equation of motion in free vibration of a flexural uniform beam.	10
(b)	Determine the natural frequencies and mode shape for uniform beam with both end simply supported.	10

Name of the Examinations: B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2018

Subject: STRUCTURAL DYNAMICS   **Time : Three (3) hours**   **Full Marks : 100**

Part II

Instructions: Use Separate Answer scripts for each Part

Answer all

1. a) Develop the expression for 'transmissibility' in a base excited SDOF system.

   b) Show that for a machine attached to a base with a spring and a dashpot, the ratio of the transmitted force to the base with the developed force in the machine follow the 'transmissibility' principle.

   c) A 200 kg machine is attached to a spring of stiffness 4×10^5 N/m. During operation the machine is subjected to a harmonic excitation of magnitude 500 N and frequency 50 rad/sec. Design an undamped vibration absorber such that the steady state amplitude of the absorber mass is less than 2 mm. $(5 + 8 + 7)$

2. From the extended Hamilton's principle develop the Lagrange's equation of motion for a MDOF system. (20)

3. Obtain the expression for impulse response function for a single degree of freedom system. Hence, using convolution theorem, obtain the response of a SDOF system subjected to a loading shown in Figure 1. $(5+15)$