

SUBJECT CODE: 8047
FACULTY OF ENGINEERING AND TECHNOLOGY
M.E.(Structural Engg.) Examination Nov/Dec 2015
Structural Dynamic & Earthquake Engg.
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

- N.B
- i) Solve any two questions from each section.
 - ii) Figures to the right indicate full marks.
 - iii) Use of non-programmable calculator is allowed.
 - iv) Assume suitable data, if necessary and state clearly.
 - v) Use of IS-1893 (Part-I:2002) is allowed

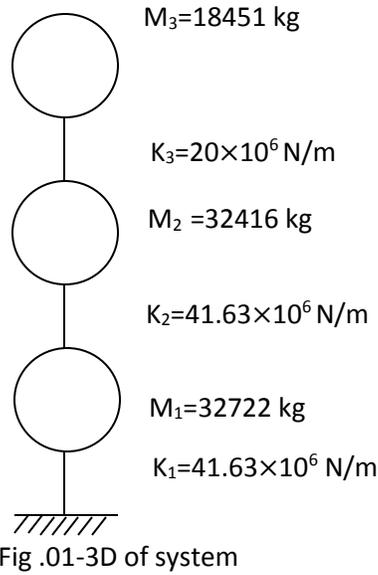
SECTION-A

- Q1.a Derive an equation of motion for single degree of freedom system if it is subjected to external force. 12
- b In the experiment t determine the damping characteristics of a system a viscously damp mass of 5kg 8
 undergoes a resonant amplitude of 1.4m with a period of 0.35 sec .when subjected to a harmonically excited force of 245.25N.determine the damping co-efficient $r=1$ when $x=x_{max}$
2. a Describe seismic waves in detail with neat sketches. 10
- b A machine 100 kg mass is supported on springs of total stiffness 700KN/m and has an unbalanced rotating element, which results in disturbing force of 500 N (harmonic) at a speed of 800 rpm .Assuming damping ratio of 0.2. 10
- Q3.a Discuss and derive the Duhamel’s integral approach to the solution of single degree of freedom system subjected to general type of loading. 8
- b Explain(i)lumped mass modes and (ii)continuous mass modes 6
- c What do you understand by degree of freedom for a system .Explain a) single degree freedom 6
 b) Multi degree freedom with neat sketch.

SECTION-B

- Q4.a Explain various seismic methods of analysis as per IS 1893 (part-1):2002. 10
- b What are the factors affecting ductility. 5
- c Explain briefly how the response of SDOF system subjected to general dynamic load is evaluated. 5
- Q5.a Develop the modal analysis procedure of a MDOF system starting from differential equation of motion. 10
- b Derive expression for mode shapes and frequencies of a uniform cantilever beam and determine the first three frequencies and mode shapes. 10

Q6. Determine the design seismic force by the response spectrum method of IS 1893-2002 for a –storeyed residential building idealized and modeled as shown in fig 01 .It is located in Zone V show mode shapes and corresponding natural frequency, time period amplitude of each mode. 20



Q7. Write short notes on:- (any two) 20

- i) Frequency response curve
- ii) Types of damping
- iii) Bhuj Earthquake of 26 th Jan 2011
- iv) Causes of earthquake
- v) Force transmitted to the foundation.