

SUBJECT CODE NO:- P-8197
FACULTY OF ENGINEERING AND TECHNOLOGY
M.E.(Structural Engg.) Examination MAY/JUNE-2016
Structural Dynamic & Earthquake Engg
(Revised)

[Time: Three Hours]

[Max Marks:80]

- N.B
- “Please check whether you have got the right question paper.”
- i) Solve any two questions from each section.
 - ii) Use suitable additional data is necessary and state it clearly.
 - iii) Use non-programmable calculator is allowed.
 - iv) Use of IS.1893 (Part I: 2002) is allowed.

Section A

- Q.1 a) Distinguish between free undamped vibration and force undamped vibration. 08
b) A platform of weight 20KN is supported by four equal columns which all damped to the foundation 12
as well as to the platform. A static force at 5KN applied horizontally to the platform produces a
displacement of 2.5mm. It is estimated that damping is 5% of critical damping. Determine
a) Natural frequency
b) Absolute damping co-efficient
c) Logarithmic decrement
d) The no. of cycle and time required for the amplitude of motion to be reduced from 2.5mm to
0.25mm.
- Q.2 Explain damped single degree of freedom system under free vibration for critical damping, over and under 20
damping with equations.
- Q.3 a) Explain single degree of freedom system subjected to support motion. 10
b) Explain Dynamic magnification factor. 05
c) Explain Newark's Beta method for linear and non-linear responses. 05
- Q.4 Write short notes on:- 20
i. Orthogonality conditions of free vibrations mode shapes
ii. Vibration isolation and transmissibility
iii. Coulomb damping in SDOF system
iv. Impulsive loading

Section B

- Q.5 a) Explain Stodola procedure used for finding the natural frequencies and mode shapes of a multi-degree freedom system. 15
- b) Describe the fundamental objective of structural dynamics analysis and narrate the importance of vibration analysis. 05
- Q.6 a) A single degree of freedom ($m=9100$ Kg) with viscous damping is displaced from its position of rest by a distance 30mm. If maximum displacement on return swing is 20mm on 0.5 sec. Determine 08
- i. The spring constant K
- ii. The damping constant
- b) Describe Epicenter, Hypocenter, and seismic waves in detail with neat sketches. 12
- Q.7 a) For a lumped mass multi-degree freedom system, explain how the response is obtained using nodal superposition method. 12
- b) Explain ductility considerations in earthquake resistant design as per IS 13920:1993. 08