Seat No.: \_\_\_\_\_

Enrolment No.\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**ME – SEMESTER IV (NEW) – • EXAMINATION – SUMMER 2016** 

Subject Code: 2742003

Date:04/05/2016

Subject Name: Advanced Seismic Design of Structures Time: 10:30 am to 01:00 pm

**Total Marks: 70** 

**Instructions:** 

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Enlist various earthquake parameters to be used as seismic input giving suitability and limitations of each.
  - (b) Define power spectral density function. Differentiate PSDF and Fourier amplitude spectrum?
- Q.2 (a) Explain in detail how D-V-A spectrum is constructed .Write relation between 07 three tripod quantities?
  - (b) A 5 m long steel pole supports 2000 kg mass attached at its top as shown in the 07 fig.1.Determine (i) natural frequency and natural period of the system (ii) Peak deflection and bending stress due to El, Centro ground motion (tripod spectra is shown in fig.2 for 0,2,5,10 & 20 % damping).Neglect weight of pipe. Take external dia.of pipe =150 mm, Internal dia. =134 mm.Assume suitable damping level.

OR

- (b) Explain elastic Response and Inelastic Response giving examples of 07 approach/methods used.
- Q-3 For the system shown in the fig.3.determine the mass and stiffness matrices and 14 the corresponding influence coefficient vectors. Consider uniform mass distribution. Stiffness of all columns is same along both the directions.

## OR

- Q-3 (a) What is multi support excitation? Enlist the cases (civil engineering) in which 07 multi-support excitation is to be consider in seismic analysis. Find the "r" matrix (influence coefficient matrix) for the frame shown in Fig.4.
  - (b) For the system shown in the fig.5.determine the stiffness matrix and the 07 corresponding influence coefficient vectors. Consider uniform mass distribution. Stiffness of all columns is same along both the directions.
- Q-4 (a) Explain performance-based seismic design.
  - (b) Enlist the possible brittle failure modes in RCC structure and explain in details 07 the preventive measures to prevent/control them.

## OR

- Q-4 (a) What is capacity design? Explain capacity design of beam, column and footing 07 giving suitable example.
  - (b) Explain meaning of soil structure interaction with respect to seismic response. 07 Differentiate kinematic and inertial interaction.
- Q-5 (a) Explain Pushover Analysis in detail 07 (b) Explain Direct method for soil- structure interaction problems with illustrative sketches. 07

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- Q-5 (a) Explain sub structure method for soil- structure interaction problems with illustrative 07 sketches.
  - (b) Explain equivalent spring-dashpot analysis for soil- structure interaction problems with **07** illustrative sketches.

