PART A

Answer all questions. All questions carry equal marks.

I. a. Estimate total seismic energy released during an earthquake of Magnitude 7.

b. List the earthquake hazards related to geotechnical engineering.

c. Define Moment Magnitude of Earthquake.

d. Define Cyclic Stress Ratio (CSR) and number of equivalent uniform stress cycles.

e. Differentiate between low-strain and high strain tests used for the measurement of dynamic soil properties.

f. List five soil improvement methods for mitigation of Earthquake hazards.

g. Differentiate between seismic down-hole test and seismic up-hole test.

h. Define critical void ratio and state the use of critical void ratio line in liquefaction studies.

[8 X 5 = 40]

PART B

Answer any one question from each module

Module I

II. a. Describe continental Drift and Plate Tectonics.

b. An earthquake causes an average of 2.5m strike-slip displacement over an 80 km long, 23km deep portion of a transform fault. Assuming the rock along the fault had average rupture strength of 175 kPa, estimate the seismic moment and moment magnitude of the earthquake.

[10]

III. a. Describe the criterions by which liquefaction susceptibility can be judged.

b. Differentiate between Flow Liquefaction and Cyclic Mobility.

[10]
Module II

IV.  a. Describe seismic refraction test setup with principle and procedure for horizontal layering.  [10]
b. Describe Seismic Cross-hole test.  [10]

V.  a. State the advantages and limitations of shaking table test and centrifuge test.  [10]
b. Define the terms: Maximum shear modulus, Shear modulus, Damping ratio, Modulus reduction curve, Damping ratio curve.  [10]

Module III

VI.  a. Describe Seismic design considerations of foundations based on bearing capacity and settlement.  [10]
b. Explain anyone ground improvement method based on drained technique for mitigation of earthquake hazards.  [10]

VII. a. Write in detail about Vibroflotation  [10]
b. Write a short note about the estimation of earthquake induced settlement of dry sand.  [10]