Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(GET)/SEM-3/GTE-302A/2012-13

2012

GEOTECHNICAL EARTHQUAKE ENGINEERING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions. 5 × 14 = 70

1. What is the primary cause of continental drift ? An earthquake causes an average of 2.5 m strike-slip displacement over an 80 km deep portion of a transform fault. Assuming the rock along the fault had average rupture strength of 175 kPa, estimate the seismic moment.

2. Assuming *p* and *s* waves travelled through the crust at 6 km/sec and 3 km/sec respectively, estimate the epicentral location of the hypothetical earthquake whose characteristics are given below :

Seismograph	***p wave arrival time***	***s wave arrival time***
A (0, 0)	06 : 11 : 18.93	06 : 11 : 26.40
B (40, 250)	06 : 11 : 14.843	06 : 11 : 18.71
C (250, 40)	06 : 11 : 17.26	06 : 11 : 23.53

(Coordinates are in km)

3. Develop the governing equation of longitudinal elastic wave in a rod of infinite length. What is the value of longitudinal wave propagation velocity ? Find the relation between particle velocity and wave velocity in such case. For a typical value of $\mu = 0.3$, find the ratio between p and s wave velocities.

4. State Snell's law. Explain the principle of seismic refraction test. For a single horizontal layer, find the expression for thickness of the layer from such test.

5. What are the important characteristics of primary significance for strong ground motion ? Describe with a neat sketch an SDOF seismograph. Give the expression for the ratio $\frac{|u|}{|ug|}$, where u is seismograph trace displacement and $|ug|$ is the ground displacement.

6. What is meant by liquefaction ? State the effects of liquefaction in a venerable site. Develop a flow chart for liquefaction susceptibility assessment at a site.

7. Explain Wallace's solution for dynamic bearing capacity of a long footing. State the assumption made in developing the analysis.

8. Write short notes on the following :

a) Counter measures against liquefaction

b) Different hazards caused by ground shaking

c) Peak horizontal acceleration (PHA) and its relation to earthquake intensity

d) Seismic downhole test

e) Elastic rebound theory.