NAME_____**STUDENT I.D.**_____

EARTH 270 : DISASTERS AND NATURAL HAZARDS

MID-TERM EXAM [February 16, 2017]

20 Questions: 5 marks each (Total of 100 marks)

ANSWER ALL QUESTIONS; ILLUSTRATE YOUR ANSWERS WHERE POSSIBLE

1. In 2010 air travel in NW Europe was seriously affected by volcanic ash in the atmosphere from an eruption in Iceland. What is the plate tectonic setting of this volcanism?

2. List three factors that contributed to the massive death toll in the 2010 Haiti Earthquake.

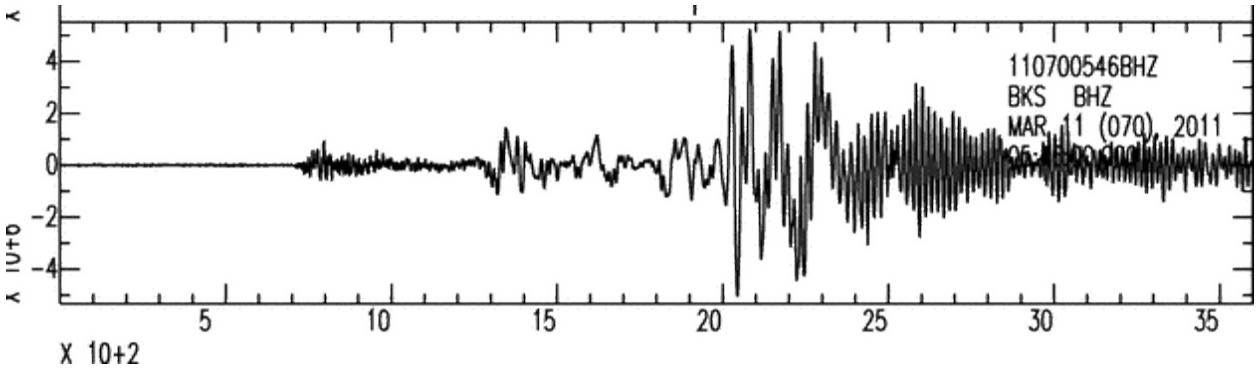
3. What are the requirements for the occurrence of a natural disaster?

4. What does the equation $F=aM^{-b}$ tell us about the magnitude (M) and frequency (F) of natural hazards? Illustrate your answer with a sketch of an earthquake magnitude-frequency plot, <u>labelling the axes.</u>

5. With respect to your answer in Question 4, comment on the implications for the hazard assessment of earth impacts by asteroids. Illustrate your answer.

6. What was the plate tectonic setting of the 2015 Nepal Earthquake?

7. On the seismogram of the 2011 Japan Earthquake below, recorded at Station BKS (University of California at Berkeley), label with a vertical arrow the onset of (a) the P wave, (b) the S wave and (c) the Surface Waves.



8. Based on the diagram and your answer in Question 7 estimate the time difference between the arrival time of the P and S waves at this station (Station BKS) ? The scale on the horizontal axis is in minutes. At a different station (Station ZXG) this time difference is 15 minutes. Which seismoraph (BKS or ZXG) is nearest to the epicentre?

9. List three data requirements for seismic hazard assessment.

10. Describe the type of tectonic plate boundary involved in the following earthquake disasters; a) the 1138 Aleppo (Syria) Earthquake b) the 2010 Haiti Earthquake.

11. Outline a four-stage strategy for the design of mitigation measures to reduce disaster losses from tsunamis in a coastal area.

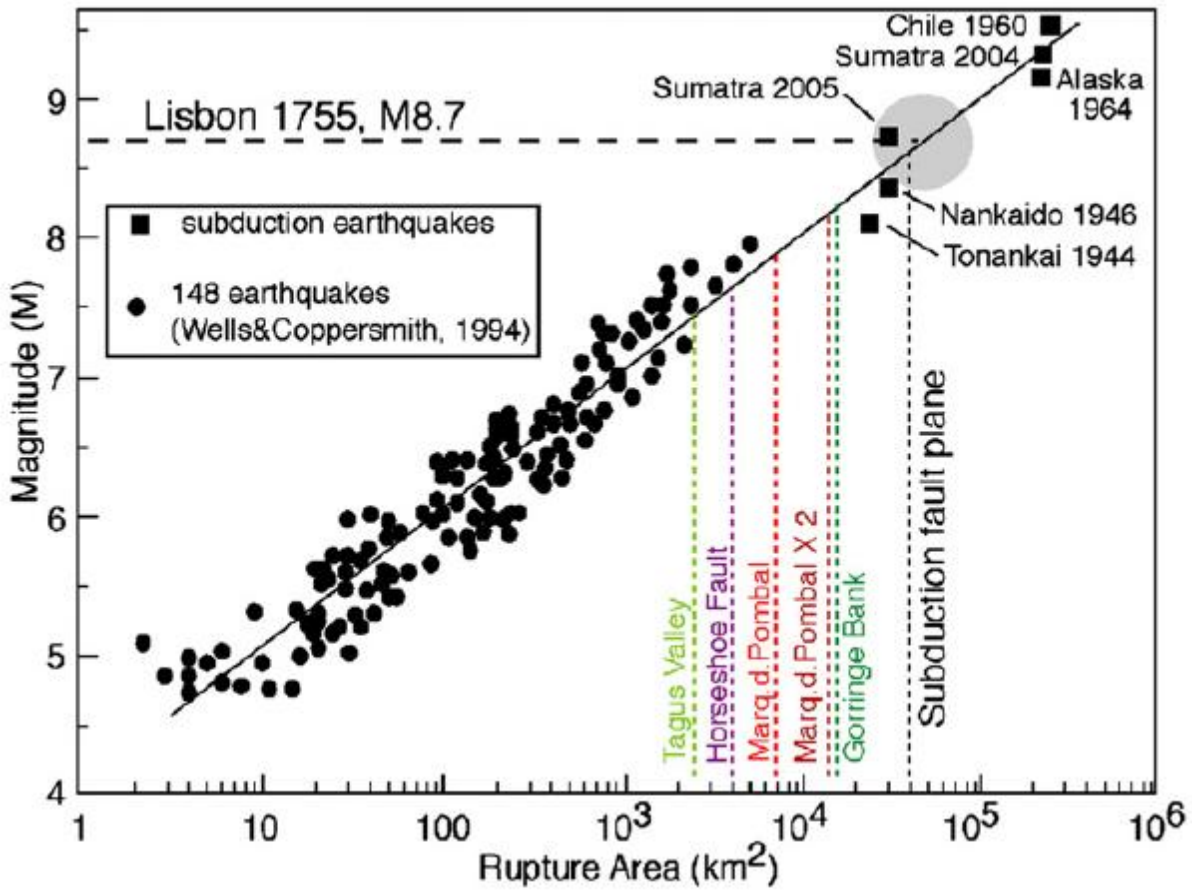
12. Explain why certain areas of Mexico City suffered markedly more building damage than other parts of the city during the 1985 Mexico City earthquake.

13. Which of the following hazards are affected by the processes of climate change: a) earthquakes, b) tsunamis, c) floods, d) volcanoes.

14. Describe the basis for the Mercalli Intensity Scale. Sketch the relationship between peak ground acceleration and Mercalli Intensity?

15. Suggest a methodology for a magnitude scale for volcanic eruptions?

16.



Examine the plot above. Then answer the question "Why do subduction zone earthquakes generate the largest earthquakes ever recorded?"

17. List three lines of geological evidence (found at coastal locations) that could be used to reconstruct the occurrence of very large earthquakes along a major subduction zone.

18. Why are floods considered to be the universal hazard?

19. What process is responsible for most deaths in volcano-related disasters?

20.

The Effect of Urbanization on Floods of Different Recurrence Interval

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Studies have shown that the urbanization of a catchment can drastically change the flood characteristics of a river. Published results are synthesized to show the general relationship between the increase in flood flows following urbanization and both the percentage of the basin paved and the flood recurrence interval. In general, (1) floods with a return period of a year or longer are not affected by a 5% paving of their catchment, (2) small floods may be increased by 10 times by urbanization, (3) floods with a return period of 100 yr may be doubled in size by a 30% paving of the basin, and (4) the effect of urbanization declines, in relative terms, as flood recurrence intervals increase.

Read the above abstract. What are the implications of this research for evaluating the influence of urbanisation on a) small frequent floods and b) massive rare floods.

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