

國立中央大學104學年度碩士班考試入學試題

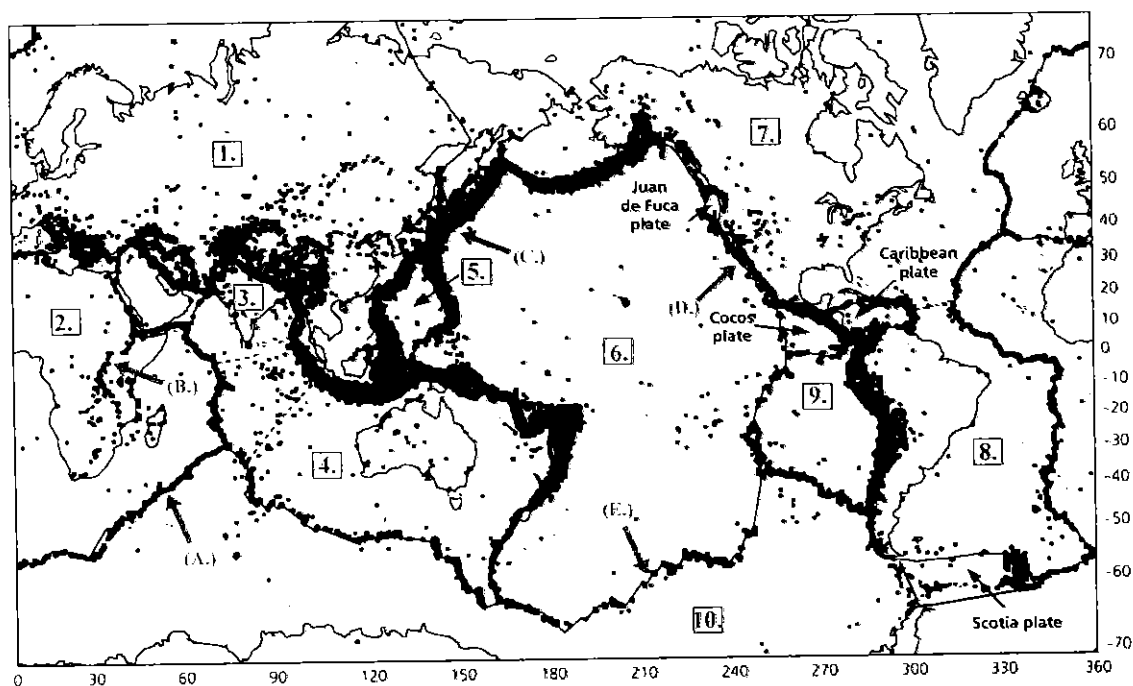
所別：地球科學系地球物理碩士班 不分組(一般生) 科目：地球物理學 共 2 頁 第 1 頁

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*請在答案卷(卡)內作答

參考

1. What are ophiolites and their tectonic significances? Name one place in the world where ophiolites can be found and describe its tectonic environments (10%).
2. In modelling the thermal structures of an oceanic lithosphere, we derive a half-space cooling model that the heat flow is inversely proportional the square root of age ($t^{-\frac{1}{2}}$). Please describe what simplifications are made for the half-space cooling model and what observations can be used to test the results (10%)?
3. Given a two-layer structure with velocity V_1 on top of a halfspace with a higher velocity V_2 , draw a figure to show the paths of direct, reflected, and head waves and their corresponding travel time curves. How would you determine V_1 , V_2 , and thickness of V_1 (10%)?
4. In Gravity observations, what is Isostasy? Describe Airy's and Pratt's Hypothesis, respectively (10%).
5. Write the names of plates from 1. to 10. in the figure (10%).
6. Name types of plate boundaries from A. to E. in the figure. For earthquakes occurring in A. to E., draw the focal mechanisms for each one. Please consider both types and fault directions of focal mechanisms (10%).



注意：背面有試題

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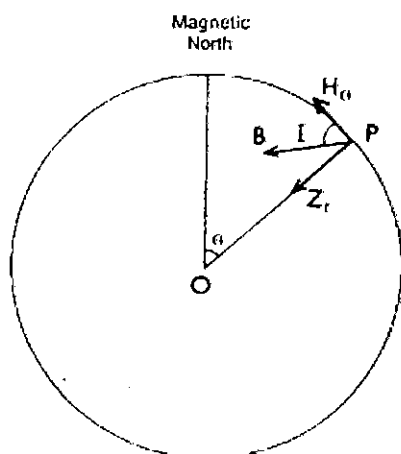
7. List all types of seismic waves that you know of and describe the particle motions for each type (10%).

8. What is inversion in Geophysics? Find the least squares solution of the line $y=ax+b$ that is determined by three points (0, 0), (1, 1), (-1, -2).

[hint: $\begin{pmatrix} c & d \\ e & f \end{pmatrix}^{-1} = \frac{\begin{pmatrix} f & -d \\ -e & c \end{pmatrix}}{\begin{vmatrix} c & d \\ e & f \end{vmatrix}}]$ (10%)

9. Given that magnetic potential $V(\vec{r})$ is proportional to $\frac{\cos\theta}{r^2}$, use figure below to show that $\tan I = 2\tan\lambda$, where I is inclination and $\lambda = 90 - \theta$.

[hint: gradient $\vec{\nabla}V = \left(\frac{\partial V}{\partial r}, \frac{1}{r}\frac{\partial V}{\partial\theta}, \frac{1}{r\sin\theta}\frac{\partial V}{\partial\phi}\right)]$ (10%)



10. What is the half-life $\left(T_{\frac{1}{2}}\right)$ of radioactive atoms? Given that the rate of

disintegration $\left(\frac{dN}{dt}\right)$ is proportional to the number of atoms present, show that

$T_{\frac{1}{2}} = \frac{1}{\lambda} \ln 2$, where λ is the decay constant (10%).

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